Definite Nominals in Discourse Comprehension

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Publication date:
2005

Citation for published version (APA):
Ravnholt, O. (2005). *Definite Nominals in Discourse Comprehension*. Roskilde Universitet.

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Table of Contents

1. Introduction: Definite Nominals in Discourse Comprehension

Experiments on memory for discourse and text support the intuition that the content of a discourse is remembered far better than the expressions used to convey it. This is often taken to indicate that the representation of discourse is a representation of content only, except possibly for the sentence or utterance currently being processed.

But the understanding of "shorthand" expressions - anaphors and ellipses - appears to rely also on representations of features that are usually attributed to the expression side. In many languages - English being an exception in this respect - the choice of a pronoun in an anaphoric expression depends on the grammatical gender of its antecedent noun, as much as on the "personness" and "natural gender" of its referent; and in nominals, including elliptical nominals, the determiners and adjectives may depend on the gender of the head noun, even when it is elided. This seems to indicate that, since speakers take the trouble of expressing such information, it is (or can be) used by hearers in comprehending discourse, even if the example of English shows that the task can be performed without this information.

It can be argued that even though the restitution of (at least some kinds of) elliptical expressions depend on the exact formulation of its antecedent, this may be reconstructed from the representation of content, rather than retrieved from a representation of the expression itself (Garnham 198?). The evidence cited is that there always a distance effect on processing time, which is not always the case in pronominal anaphora, and that plausible, rather than linguistically correct, interpretations of elliptical expressions occur, especially if the antecedent is not in the immediately preceding sentence.

But if - as in Danish - elliptical nominals carry the same kind of information (number and gender) about their antecedents as pronouns do, the resolution processes, at least for nominals, may be more alike. Possibly, the reconstruction argument may be extended to gender, especially since "natural gender" - sex, i.e. - usually overrides grammatical gender if it is at all relevant, e.g., where *hun* (*she*) is coreferential with *pigen* or *pigebarnet* (*the girl* or *girl child* grammatically common and neuter respectively); but in some cases grammatical gender may prevail: German *es* (*it*, neuter) may be coreferential with *das Mädchen* (*the girl*, grammatically neuter, though "naturally" feminine, of course). Furthermore, even if there may be a semantic basis for gender, it is weak, not easily established on synchronic grounds and does not appear to cover the entire vocabulary

Still, there is massive evidence that the mental representation of discourse beyond the sentence currently being processed, is primarily a representation of content, and that, over time, the expressions used to convey that content are forgotten.

The two major problems to be considered in the present study, then, are

1. what is the information content of the mental representation of discourse that hearers draw upon in the comprehension of definite nominals, and
2. how is that content structured.

The assumption underlying the study is that the presupposing relationships that obtain between definite nominals and their antecedents provide a window to the content and structure of the mental representation of discourse, which is tacit knowledge, not directly accessible by introspection.

One of the reasons natural language is an efficient means of communication between humans is that participants in a discourse will usually try to make sense, i.e. to make their contributions *coherent* with what went before, and try to interpret the contributions of other participants as coherent and meaningful in the context. Discourses are connected and meaningful wholes, they are not just random collections or sequences of contiguous sentences or utterances.

There are two principal factors, one semantic and the other pragmatic, that contribute to making discourse out of sequences of sentences (Johnson-Laird 1983, 395):

1. *connectedness* in the form of referential coherence between sentences as evidenced by the resolution of anaphoric reference in discourse comprehension, and
2. *plausibility* with respect to world knowledge common to the discourse participants, whether in the form of commonly assumed general background knowledge or of knowledge communicated or assumed in the ongoing discourse.

By using a grammatically definite nominal, be it a pronoun, a proper name, a full nominal, or an elliptical one, the speaker indicates that the hearer should be able to retrieve or establish the discourse referent of the nominal from what he already knows, either from the ongoing discourse, from the situation in which it takes place, or from general experience. This means that understanding a definite nominal presupposes some cognitive representation in which its referent is sufficiently salient to be identified or from which it can be inferred.

Many definite nominals are used to make *exophoric* reference, i.e. the information needed to make the reference definite derives from the situational context in which they are used, not the context built up by the text or discourse. Prototypical examples of this are the 1st and 2nd person personal pronouns, *I* and *you*, which are determined deictically, with respect to the roles of speaker and hearer in the speech situation. Demonstrative pronouns, such as *this* and *that*, may also be used deictically And even full nominals (*the sun, the president, the boss*) may be used in

this way, although it is not always easy to draw a clear boundary between proper exophoric reference and some of the endophoric uses that depend on general knowledge.

In other cases definite nominals have *endophoric* reference: the information needed must be derived from *antecedents* in the textual or discourse context. Antecedents usually precede the definite nominal in the text, in which case the nominal is *anaphoric* in the strict sense; if the nominal precedes the antecedent it is *cataphoric* Cataphoric expressions that are not "structurally determined" (Halliday & Hasan 1976: 56) within the sentence or an even narrower structure, so that they do not contribute to intersentential cohesion, are very infrequent in the corpus investigated in this study And in Danish, even the "textually cataphoric" use of demonstratives (with antecedents to which the referring expressions are not structurally related) is not common. Hence, the term *anaphoric* is often used broadly, as a synonym of *endophoric*.

With anaphoric expressions the intended referent is often identical to the antecedent, but other relations than identity (accomplished by "bridging" inferences) are quite common as well. And even when the anaphor and antecedent are coreferential, new information about the intended discourse referent (or the speaker s attitude towards it) may be conveyed or implied by the anaphor

The presentation of some theoretical approaches to discourse and anaphora in the following sections will focus on how these approaches view discourse comprehension and discourse representation in general, more specifically on how they view the resolution of anaphora, and most specifically on the treatment of bridging references in which the intended referent of the anaphor is not identical to the antecedent, even though it depends on it. In conclusion to this chapter, the empirical study of definite nominals that was conducted will be introduced.

The empirical study will be presented in detail in chapters 2 and 3, that deal with the role of grammatical cues and lexical specifications in discourse comprehension, respectively Chapter 4 presents an outline of a process model for discourse comprehension.

The first section of chapter 2 introduces the types of nominal expressions that were studied, the next section presents the results in terms of the frequencies of different expressions with exophoric, identical, and bridging reference, and the distributions of expression types over textual distances to the antecedents; and the final one discusses theories that have been proposed to account for the role of grammatical cues in the assignment of reference to definite nominals in discourse comprehension.

Chapter 3 first introduces the types of anaphoric relationships found in the corpus in some detail, then presents further results of the study in terms of frequencies of the different relationships with different expression types, and distributions of nominals with different relations to the antecedents over referential distances; and finally discusses theories that have been proposed to account for the role of lexical specifications in reference assignment.

Chapter 4 outlines a process model for discourse comprehension. First the representations and information content of concepts are discussed as they appear to be presupposed in the lexicon, in nominals currently being processed, and in the permanent representation of discourse. And the final section proposes a model of the retrieval of antecedents and establishment of referents in discourse with criteria for matching between the specifications of referents in definite nominals and of antecedents in the discourse representation.

1.1. An AI Approach to Discourse

The theory proposed by Grosz & Sidner (1986) is, they claim, a theory of discourse structure, not of the nature of mental representations and processes. Therefore information or knowledge structures are suggested that can be taken as prerequisites for human (and machine) discourse comprehension, rather than formats for the representation or implementation of such structures in the mind. The main contribution from AI to discourse comprehension is, in my view, the investigation of the focusing structures that determine the variation of the salience or accessibility of the discourse referents in their role as candidate antecedents for anaphors, at the time when they are introduced in the representation of the discourse, also they have looked into the possibilities for implementation. The main drawbacks of Grosz & Sidner's theory are that it is not psychologically plausible that the representation of discourse should be a tripartite structure, nor that the attentional state should be represented as a stack.

The structure of a discourse is viewed as a composite of three distinct, but interacting components:

1. a *linguistic structure*, i.e. the "grammatical" structure of the actual sequence of utterances in the discourse in terms of segmentation and of coordination and subordination of segments;
2. an *intentional structure*, the basic elements of which are discourse intentions and the relationships between them, primarily dominance (goal/subgoal relationships) and satisfaction precedence (temporal ordering of goals);
3. an *attentional state* with information about the objects, properties, relations and discourse intentions that are most salient or focused at any given point.

The intentional structure provides a complete history of the discourse purposes established so far and the relations between them, whereas the focusing (or attentional) structure is related only to the current state of the discourse, or rather, to currently unresolved purposes, but with a built-in structuring of its elements that depends on the linguistic structures and expressions that provided its basis. At the end of a discourse, then, there will be a fully developed intentional structure, whereas the focus stack will be empty

1.1.1. Linguistic Structure - Segmentation

Utterances are aggregated into discourse segments, the boundaries of which may be marked explicitly by particular words or phrases (*now, and, but*, etc.) or by more subtle cues, such as intonation or changes in tense and aspect. Such boundary markers provide information at the discourse level, not the sentence level: they indicate changes in the intentional or attentional structures. Boundaries may also be indicated implicitly by the relationships between intentions at the level of the current utterance and purposes at the level of the active discourse segment.

In its turn, discourse segmentation affects the interpretation of linguistic expressions by constraining the scope of anaphoric referring expressions such as pronouns or definite nominals, like Kamp's (1981, 1988) DRs or Fauconnier's (1985) mental spaces.

1.1.2. Intentional Structure

Discourses have purposes which are like intentions in speech act theory; for any discourse, one such purpose, the *discourse purpose*, will provide its foundation, whereas the *discourse segment purposes* specify the contribution of discourse segments to the overall discourse purpose. It is characteristic of the purposes of discourses or discourse segments that they are intended by speakers to be recognized, in fact, it is essential to their achieving the intended effect that they are recognized by hearers. The motivation for participation in a discourse is distinct from the discourse purpose and external to the discourse itself. The motivation for any participant to engage in a discourse may be private, not intended to be recognized. a speaker who engages in a discourse with the aim of impressing some other participant(s) will probably have a better chance of succeeding if that motivation is not recognized, but the discourse employed for it will not be understood if the discourse purpose is not recognized - it may of course be quite impressive anyway

Planning and plan recognition are central to this theory of discourse comprehension: the satisfaction of the discourse purpose is a main goal of a discourse. The satisfaction of subgoals, the discourse segment purposes, *contribute* to the satisfaction of the discourse or discourse segment purpose that *dominate* them. Dominance relationships are linked to equivalent *support* relationships between propositions, and *generation* relationships between actions. The temporal order in which purposes are satisfied may be important, i.e. discourse segment purposes may have a *satisfaction-precedence* relationship with each other So, even though there is no finite list of possible discourse purposes, there are just two types of relations between purposes, which, it is claimed, should make plan recognition possible.[1]

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[1] It may not be sufficient for a computer implementation, though. Henry Kautz' (1987) plan recognition system works only if the set of possible actions in the domain is finite, and David Chapman (1987) proves that "classical planning" systems are NP-complete: the mechanism may run for ever without deciding whether the problem has a solution or not.

1.1.3. Attentional Structure - Focusing

The global attentional state is modeled by a *focusing structure* consisting of a stack of *focus spaces*, each associated with a discourse segment, that contain the entities (objects, properties, and relations) that are salient at that point in the discourse, including the discourse segment purpose. A new space is pushed onto the stack whenever the discourse segment purpose for a new segment contributes to that of a preceding segment. If the space for that segment is not on top of the stack, the spaces above it are popped from the stack.

The attentional state model constrains the range of discourse segment purposes that are considered as candidates for domination or satisfaction-precedence of the current discourse segment purpose, and the search for possible referents of definite nominals and pronouns. Within each focus space, candidates are ordered according to local focusing mechanisms, involving preferences based on syntactic focus marking (by clefting, etc.) as well as semantic criteria (such as animacy and an ordering of constituents by semantic roles) (Sidner 1983). In the resolution of definite nominals the focus state is searched for possible antecedents of expressions with undetermined reference.

1.2. Mental Models as Discourse Representations

1.2.1. Discourse Processing and Representation

The starting point of Philip Johnson-Laird's theory of mental models (1983) is the observation that human beings do not appear to make inferences by formal logical rules involving propositions, but rather by an ability to use propositions to construct and manipulate mental models from which conclusions can be read directly Since it is also evident from experiments on memory for discourse that what is remembered is the content of the discourse, not the expressions used, the same ability is assumed to be applied in discourse comprehension as well. This aspect of mental models theory has been worked out in Garnham 1987 (orig. 1981) and in later work by Garnham and his colleagues.

Two claims are important in the mental models approach to discourse. In Garnham s (1987) formulation they are

1. "texts and discourse are encoded in mental models, and ( ) these representations are the psychologically important ones." (Garnham 1987· 19)
2. " representations of discourse should centre around tokens standing for things that the discourse is about, rather than for expressions in it." (Garnham 1987 20)

1.2.1.1. *Models and Propositional Representations*

The form of mental models "is distinct from that of propositional representations. A model *represents* the state of affairs and accordingly its structure is not arbitrary like that of a propositional representation, but plays a direct representational or analogic role. Its structure mirrors the relevant aspects of the corresponding state

of affairs in the world." (Johnson-Laird 1981. 174). However, to ensure that the consistency of the mental model constructed can be checked, not only with respect to the preceding version of the model and the latest premise (in propositional form), but with respect to all the premises involved, a double representation of discourse is taken to be necessary, consisting of propositional representations ("close to surface linguistic structure") as well as mental models, but used for different purposes. The relationship between the two is described as a mapping of "propositional representations into mental models of real or imaginary worlds: *propositional representations are interpreted with respect to mental models.*" (Johnson-Laird 1983: 156).

However, when the device is applied to discourse comprehension it "constructs a *single* mental model on the basis of the discourse, its context, and background knowledge" (Johnson-Laird 1983, 128). In reasoning up to three models must be constructed in order to handle the most difficult types of syllogisms. This means that the model constructed will be like the configuration of the pieces on the chess board in the sense that it can not incorporate a representation of its own history, of how it came about. The history of the discourse is remembered only in the form of propositional representations, that are denounced by Garnham as psychologically unimportant in discourse comprehension.

I take that as an indication that propositional representations are seen as more short-lived in discourse comprehension than in syllogistic reasoning because there is no special reason to remember utterances more or less verbatim, unless, as in reasoning, one may need them to check the consistency of the model against the premises. And, in fact, when tested with complex syllogisms, many subjects actually do make errors because they are not capable of building consistent models.

Furthermore, there is a kind of discourse history that is important in discourse comprehension, but has nothing to do with the consistency of models with respect to the sentences or utterances from which they are built. Referents in the discourse model are not equally eligible for the role of antecedent in the processing of definite nominals. More recently mentioned referents and more topical or focused referents are more accessible. Mental models do not appear to have any means for the representation of such information.

1.2.1.2. Reasoning with mental models

Reasoning, according to Johnson-Laird (1983), is accomplished in the following three step procedure:

1. construct a mental model of the first premise;
2. add the information in the further premises to the model, looking for counterexamples and adding more models as needed,
3. find the relation between the 'end' terms that holds in all those models.

What is not clear is the effect of background knowledge in this context: in what ways does it influence the construction of models. What happens, e.g., if the terms are related to each other independently of the discourse in an abstraction hierarchy

or in another of the many relationships described in text linguistics (as might be the case in everyday reasoning which is concerned with things related in many different ways to each other in the real world, rather than abstract tokens with arbitrary relations). If tokens with assigned reference is all there is, how can one exclude a premise like "All of the baboons are chimpanzees" from the model.

From a logical point of view, of course, the empirical truth or falsity of premises (or conclusions) does not affect the validity of arguments. But if practical reasoning is influenced by knowledge about the world as Johnson-Laird demonstrates, then the assumed empirical status of premises (and also of conclusions) should be able to influence the construction of the mental models applied. The plausibility of the propositions involved with respect to real-world experience is at least as important as internal logical consistency.

Similar difficulties are at issue with other kinds of real-world relatedness as they are reflected e.g. in non-identical anaphoric relationships. One example is part-whole relationships, like the following example in which the definiteness of the nominal of the second sentence can not straightforwardly be accounted for by mental models theory (nor, I think, by any simple hypotheses about discourse structure):

A circus was in town last week. **The trapeze artist** was phenomenal.

One can plausibly claim that a circus could be part of an instantiated mental model after the first sentence, but hardly that all of its component parts would also be instantiated. Actually, since trapeze artists are not necessary, but only highly probable, components of a circus, one can not know that there is a trapeze artist in this particular circus without being explicitly told. The mention of *circus* in the first sentence creates a context in which it is very likely that a trapeze artist could be singled out sufficiently to be eligible for definite reference, but not an instantiated mental representation of a trapeze artist. The creation of an instantiation is accomplished by the interpretation of the definite nominal of the second sentence, in which the artist is mentioned for the first time, rather than by the first sentence which only provides the context for that interpretation.

The problem here is that mental models are not sufficiently rich representations, primarily in the sense that the representations of referents in them are tokens which apparently have neither internal structure, defaults or other similar implicit potentialities, nor connections with the lexicon and encyclopedia once they are established in the model. This makes it difficult to see how inexplicit semantic relations between referents and inexplicit expectations about referents could be represented. Even though the representation does not instantiate inexplicit relations and referents, it must provide the background for inferring them when necessary.

Even if such considerations can be discarded for syllogistic reasoning in which the meanings of the manipulated tokens are of little consequence, they would still hold for discourse comprehension, since plausibility with respect to background world knowledge is claimed to be an important factor in this.

Plausibility has to do with the content of the discourse and its relation to the (physical, social, etc.) world in that it "depends on the possibility of interpreting the discourse in an appropriate temporal, spatial, causal, and intentional framework" (Johnson-Laird 1983, 371), i.e. it depends on the possibility of constructing a single mental model that is consistent not only internally, but also with the history of the discourse (i.e. with a propositional representation of previous input sentences, as for inferencing) and with background knowledge about the domain it concerns. Discourses that violate basic assumptions, beliefs or expectations are experienced as abnormal.

Speakers maintain referential coherence by adhering to the Gricean principle of being helpful to their hearers: they try to restrict the possible interpretations of their discourse to a single one. If this restriction is not successful, the hearer will usually ask for clarification - i.e. he will request the speaker to choose between the possible interpretations - or he will have to bear the extra burden of keeping track of several models until the discourse progresses to let him integrate them into a single one.

1.2.2. Processing of Anaphora

One important aspect of referential coherence is the resolution of anaphoric expressions (such as pronouns, definite descriptions, nominal and verbal ellipses and substitutions). Again, this poses problems for mental models theory, because, even though a mental model will contain a representation of all the candidate antecedent referents for an anaphor, this is not sufficient for its resolution.

A major problem is that discourse comprehension has topicality or focusing devices that impose compartments and preference orderings of the candidate antecedents that differentiate and restrict their eligibility at any given point in the discourse. Focusing is a property of the discourse as such, not of its individual sentences. Therefore, the history of a discourse must contain more than a chronological sequence of propositional renderings of the sentences it comprises.

Another, admittedly minor, problem is that pronouns match only antecedents of their own gender. For English mental models this is really a minor problem since English pronouns code only animacy and "natural gender" (sex, that is) which are properties of referents, not their linguistic expressions. However, for many other languages (including most of the European ones) which have grammatical gender (which appears to be a property of expressions, not of referents) it is a bit worse: male is not necessarily masculine (or vice versa), even some confusion may occur when natural and grammatical gender are in conflict. Or, alternatively, if grammatical gender is to be based on properties of the referent, one would probably have to introduce categories like "the entities that are expressed by a neuter noun" to be able to keep track of the multitude of exceptions to general rules.

1.2.3. Mental Models as Discourse Representations

It would appear that the two central claims - that the psychologically important representations of discourse are mental models, and that they should center around tokens standing for things that the discourse is about, rather than for expressions in it - do not hold, at least not in the strict interpretation advocated by Garnham and, as far as I can see, also by Johnson-Laird, even though his focus on inferencing, rather than discourse, makes this less plain. In the current formulation of the theory, propositional representations are as important psychologically as are mental models, since they are necessary to get the models to work; and even though referents should certainly be represented mentally, mere tokens with no internal structure appear to be insufficient, and the resolution process appears to access also features that are usually attributed to expressions.

To sum up, the main problems with mental models theory as a theory of discourse representation are:

1. two different, permanent (or at least: long term) representations of the entire discourse are necessary to get the theory to account for the empirical findings that sometimes content appears to be retained in memory, and sometimes linguistic expressions;
2. mental models have too little internal structure, and the relationship between the structures manifested in mental models and those found in background knowledge is too weak to account for the establishment of discourse referents that may be referred to by bridging references;
3. mental models can not sufficiently account for the differentiation of accessibility of antecedents that appear to be of importance in the resolution of anaphora.

1.3 Cognitive Linguistics

1.3.1. Discourse Processing and Representation

In cognitive linguistics, discourse is taken to be represented as *mental spaces* (Fauconnier 1985) that are constructed as the discourse proceeds. Linguistic expressions do not refer to objects in the real world, rather, they provide guidelines for setting up, pointing to, etc., mental spaces and elements in mental spaces; these elements, then, may have reference, like the tokens in mental models. Mental spaces are continually modified to incorporate new spaces, elements and relations that are added in the discourse. Spaces may be included in each other and relationships may hold between elements belonging to different spaces.

One such space, the *current discourse space*, comprises the spaces, elements and relations that are taken to be shared by the speaker and hearer as the current basis for communication. These shared entities may figure directly in the awareness of the speaker and hearer, or they may be readily elicited by association or simple inference. (Langacker 1991, p 97).

1.3.2. Processing of Anaphora

1.3.2.1. Types of Anaphors in Relation to Aspects of the Antecedent Nominal

Langacker's view of nominals appears to provide a possible basis for going beyond the enumeration of the varieties of anaphoric relationships to a principled account that relates them to different possible profilings within the same base provided by the representation of nominals.

Anaphoric reference to facts, propositions, events etc. must be regarded as nominalization: processes are profiled as things. (In verbal substitution it appears that the arguments of the verb may be substituted by a pronoun or adverb (or elided)- the analysis proposed by Halliday & Hasan for English is dubious in my view and not easily extended to Danish, it must be considered whether this can also be attributed to nominalization, or if other processes are at large here).

Type Specification and Instantiation

The role of head nouns in nominals, as noted above, is to provide type specifications for instantiations of things. It should be easy to see that reiterations relate to such specifications. If a noun is repeated in discourse, it will carry the same specification as it did on first mention, and therefore its reference mass will be identical, and the intended referent can be retrieved as the element of that type which is salient in the mental representation of the discourse. Synonyms and near synonyms will have type specifications that are close enough to do the same job, especially if they are marked for definiteness. Superordinates and 'general' words must be processed similarly· even if the possible reference mass is larger than for identical words or synonyms because of the greater schematicity of the specification, the intended referent will still fall within it, and its salience will do the rest. Pronouns have the most schematic type specifications - possibly more schematic in some languages (e.g., English) than in others (such as Danish, but with classifier languages apparently much lower in the schematicity of pronouns) - but they work essentially in the same way, although the demands on the salience of the antecedent are greater Apparently these demands increase with increasing schematicity

In some cases the specification or reference mass is profiled, rather than the instantiation, so that a definite nominal may be employed in reference to the concept or generically, sometimes anaphorically, but very often with reference in the situation, outside the discourse itself.

Quantification

Explicitly quantified nominals with a type specification that matches that of an instantiated set may be employed in picking out subsets or elements from those sets. In that case the instantiated set is the reference mass within which the new reference must be found, rather than the entire class of things that fall under the

type specification. Numerals and other quantifiers may be used elliptically (with elided head) or pronominally

With 'vague quantifiers' subsequent anaphors may refer to the explicitly referenced set, or to its complement within the - possibly implicit - reference mass, within which the quantifier operates, whether it was introduced beforehand, or by the quantified nominal.

Similarly for nominals with added modifiers (very often with elided or substituted head) that narrow down the specification given in first introducing the set: they pick out the elements, or the subset, that is describable by the narrower specification, very often contrasting it with the complement in some respect, but the reference mass is always the originally instantiated set, not the entire class described by the type specification

Grounding

Anaphora may also relate to the grounding aspect of the nominal.

Anaphors by collocation are not grounded in the prototypical manner - with respect to the speech participants and the speech situation - but in relation to instantiations that are already grounded, and sufficiently salient to function as reference points (see below).

Comparative nominals differ from nominals with positive and superlative adjectives as modifiers and from explicitly quantified nominals in that they do not take as reference mass a set that has already been introduced in the representation of the discourse or is being introduced by the type specification provided by the head noun. Rather, such nominals designate an instantiation of a type that is identical to the type of some other instantiation already introduced, or different from it in precisely that respect in which their specifications are being compared.

1.3.3. Salience of antecedents: "natural paths"

Besides distance between antecedent and anaphor topicality is one of the very important factors in determining the salience of possible antecedents relative to each other Topicality, on Langacker's account, is decided by three factors that involve "natural paths" of decreasing salience: **semantic roles** with *agent* as the first and most salient step; **empathy hierarchy**: *speaker* > *hearer* > *human* > *animal* > *physical object* > *abstract entity;* **definiteness**: *definite* > *specific indefinite* > *non-specific indefinite.*

Similarly, antecedents are claimed to precede anaphors along some natural path, such as **temporal order**; prominence of **participants** subject > object > oblique; prominence due to **profiling**: main clause > subordinate clause (the cognitive linguistics counterpart to c-command in GB theory).

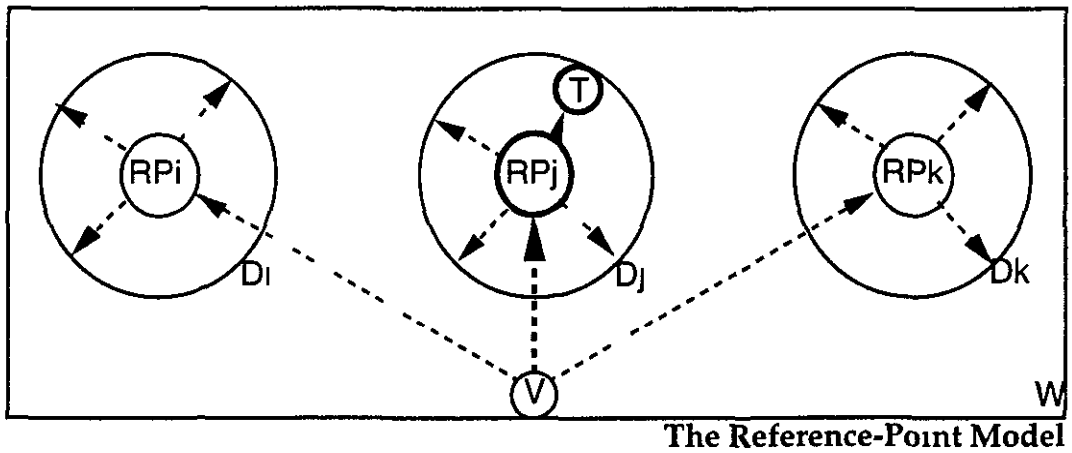
1.3.4. Non-Coreferential Relationships in Anaphor

1.3.4.1. The Reference-Point Model

Normally, nominals are grounded in relation to the participants in the speech event. Alternatively they can be grounded indirectly, by being related in a possessive construction to an entity which is salient in the discourse.

The relationships between target and reference point in these constructions are like the non-coreferential relationships in anaphora in many ways: among the prototypical ones are ownership, part-whole, and kinship, but the actual requirement is far more schematic than that. Langacker rejects the proposal that the only requirement is that the entities must be in the same cognitive domain, on the grounds that the relationship between them is usually construed as asymmetrical: the whole is a possessor of its parts and the owner of his belongings, rather than the other way round.

Instead, Langacker proposes a *reference-point model* , in which a *target* (the possessed entity) within the *dominion* of a salient *reference point* (the possessor) is grounded by its relation to that reference point.



The Reference-Point Model

The dominion of a reference point is simply its neighbourhood in the current discourse space; or the sets of objects it can be used to locate. The conceptualizer traces a mental path through the reference point/possessor to the target/possessed entity; in some cases the construal of the entities as possessor and possessed may be motivated by an objective path (as in their prototypical relationships), but the only common denominator of possessive constructions is the subjective construal depicted above.

1.3.4.2. Connectors

Fauconnier (1985) uses the concept of *connector* in a very similar way The Identification (or: ID) Principle (from Nunberg) states that if two objects, the *trigger* and *target* are linked by a pragmatic mapping function (the *connector*), a description of the trigger may be used to identify the target (p 3). A generalization of the ID principle can be applied to spaces: If two spaces are linked by a

connector, and a nominal introduces or points to an element (the trigger) in one of those spaces, it may identify or introduce a connected element (target) in the other space.

Connectors are part of idealized cognitive models which implies that they should exhibit local, cultural, social, and individual variation. Connectors appear to be learned, and to be more open (more prone to establish both trigger and target as antecedents) the more familiar they are (p. 10).

If the different relationships that are involved in relating reference points and targets in Langacker's model are of this kind, then it should be possible to rank at least the core members of the category in a sort of natural order (path). Those that are well exercised will be core members and aspire to lexical status. The part-whole relation is a likely candidate; it is sometimes claimed (Lyons 1977) that it is a lexical relation, because it appears to be necessary for the definition of certain concepts: *finger* is hardly understandable without reference to *hand* Possibly this is different for different persons and different domains. Fingers and hands are certainly far more salient in the experience of an average language user than, say, the actual, physical configuration and workings of a computer is, even to an experienced user This means that the entrenchment, and hence, presumably, the degree of lexicalization (or lexical specificity) of these relationships may differ greatly between persons and domains. - will come in handy at this point.

1.4. Relevance Theory

1.4.1. The representation of concepts

In relevance theory (Sperber & Wilson 1986) concepts are regarded as labeled triples, where the label has the two functions of being the address of the concept in memory and of representing the concept as a constituent of logical forms. The three arguments are the logical, encyclopedic and lexical entries.

The logical entry is a set of deductive elimination rules that apply to logical forms of which the concept is a constituent; the encyclopedic entry has information about the extension and/or denotation of the concept, represented in logical forms; and the lexical entry holds information about the natural-language counterpart of the concept: the word or phrase which expresses it in linguistic forms. Encyclopedic entries are variable between speakers and over time; they are open-ended: new information can be added freely; the information in them is representational and they form part of the context in which the concept is processed. Logical entries are small, finite, relatively constant; they hold computational information and they determine the content of the concept.

This, it is claimed, amounts to an "ecumenical view of lexical semantics" (Sperber & Wilson 1986, p.90): there need not be a universal format for the meanings of words. Meanings (concepts expressed) may be of different formats for different words. Entries may be empty· concepts with no extension (such as *and*) will have empty encyclopedic entries; words whose meanings are mental models of

prototypes will have empty logical entries (they have no logical conditions) and the encyclopedic entry will contain the model, or concepts may have no lexical entries - one would suspect that in that case they can be specified linguistically in other ways.

While the modularity and precise form of the representation proposed may be not quite so ecumenical after all, it should be uncontroversial that conceptual memory (or the encyclopedic lexicon) can be accessed from representations of discourse and that concepts do have logical, encyclopedic and lexical aspects inasmuch as they represent knowledge that may participate in inference according to schemas abstracted from experience (common sense or more rigorous forms of logic depending on the construal of the concept) and may be communicated linguistically in forms that also depend on such schemata.

1.4.1.1. Processing

Sperber & Wilson see discourse comprehension as a form of non-demonstrative inference, which works well because the processes human beings apply in the formation and exploitation of assumptions are constrained in suitable ways, not because humans are very good at logical assumption formation.

Assumptions can be acquired from different sources:

Perception provides elementary descriptions of stimuli. Such assumptions are strongly confirmed because the perceptual mechanisms are very reliable due to biological evolution.

Linguistic decoding assigns logical forms to stimuli, these forms are completed into propositional forms that may form part of factual assumptions about what was said.

Conceptual memory is a repository for factual assumptions and assumption schemas which can be completed to yield factual assumptions.

Deduction derives assumptions from sets of assumptions that are taken as input (premises). Formation of assumptions by deduction is taken to be the key process in non-demonstrative inference.

The deductive device has access to the logical entries of concepts and computes only non-trivial implications of assumptions, i.e. it uses only elimination rules. The strength of assumptions that are constructed either by completion of assumption schemas from conceptual memory or by deduction depends on the strength of the input assumptions and schemas together with the processing history The deductive system attempts to optimize relevance, i.e. obtain maximal contextual effects for a minimal processing effort.

Contextual effects

There are three kinds of contextual effects: newly presented information has *contextual implications* in the context of old information, and it may provide evidence for or against old assumptions, and therefore *strengthen* or *weaken* them.

So what happens when new information is incorporated in the existing context, is that first its contextual implications are derived and added to knowledge base. Then the strength of assumptions is revised according to the support they now get from other assumptions currently held. if an assumption is supported by a set of other assumptions, its strength is the product of the strengths of the supporting assumptions relative to certainty; if an assumption can be derived independently from different sets of assumptions, it inherits the highest of the strengths of the derivations; and finally, assumptions may be strengthened 'retroactively' by successful contextualization, i.e. if they yield relevant interpretations in context. After strengthening has taken place, contradictions are erased recursively; the weaker members of pairs of contradictions are erased together with assumptions that support them, and the strengths of assumptions supported by erased assumptions are adjusted accordingly

Accessibility of contexts for processing.

The other important factor in relevance is processing effort: even if the contextual effects of a piece of new information are high, its relevance may be low if the effort that is needed to derive those contextual effects is high, as it will be if the effects must be sought in a very remote context. Processing effort is minimized by ordering the contexts to be accessed in such a way that maximal (or sufficiently large) contextual effects will probably be obtained early in the process of contextualizing new information.

The available contexts are to be found.

1. in the **memory of the deductive device** itself which holds the results of the immediately preceding deduction together with the assumptions used in deriving them,
2. in **general-purpose short-term memory** which holds those results of previously performed deductions that were not used in the immediately preceding one - and which are therefore in the memory of the deductive device ,
3. in the **encyclopedic entries of concepts** that are present either in the context or in the assumption being processed,
4. and finally in the **observable physical environment** in which the discourse takes place.

What this amounts to (if one accepts the "ecumenical view") is that the representation of discourse is partitioned into an immediate context of currently or recently processed information and a more remote context with information that is not currently being processed, and from which general knowledge may be accessed as well as information derived from the setting of the speech event.

The accessibility of the contexts, and hence the order in which they are taken into account in the processing, corresponds to the order of inclusion between them: the initial context is minimal and highly accessible, and is included in still greater contexts with decreasing accessibility, because the effort needed in accessing them

increases - the relevance of an assumption is therefore dependent on the accessibility of the context needed to process its contextual effects.

For communication this is a very convenient arrangement: Basically it can be assumed that utterances will be relevant, which means that the contextual effects that can be derived from them will be worth the processing effort. A hearer will not have to first determine the processing context and then assess relevance. Rather, contextual effects are the result of the processing of utterances in still larger and less accessible contexts as long as the relevance is high enough, i.e. as long as the contextual effects yielded outweigh the effort of processing.

1.4.1.2. Processing of Anaphora

Ariel (1988,1990) proposes a theory based on Sperber & Wilson's account of discourse comprehension as a process that involves accessing processing contexts in a predetermined order. Ariel suggests that antecedents are similarly ordered in terms of accessibility The choice of the form of an anaphoric expression is dependent on the degree of accessibility of the intended antecedent with pronouns as markers of high accessibility, demonstratives marking mid accessibility, and full nominals used for less accessible antecedents (cf. sec. 2.3).

1.5. The Empirical Study

As noted above there are two major problems to be considered in the present study One is the problem of what the information content of the mental representation of discourse should be, and the other is the problem of how that content is structured. It is my view that previous research has directed too little attention to the first problem, with the result that premature conclusions have been drawn about the second one. If one does not know in some detail what information there is, then one can not begin to discuss the structures without the risk of developing sectarian views, that are not supported by empirical facts.

The empirical study has been conducted with the assumption that the presupposing relationships that obtain between definite nominals and their antecedents provide a window to the content and structure of the mental representation of discourse, which is tacit knowledge, not directly accessible by introspection. Information that is presupposed.

1.5.1. The Corpus

The corpus studied consists of 22 short Danish texts and excerpts sampled from different sources: novels, formal and informal cook books, newspapers, and technical and non-technical instruction texts and manuals. They include the diverse discourse functions of narrative, instruction, argumentation, and description. The corpus contains a little more than 18000 words; the longest text has 2564 words, the shortest 307, and the average is 834. The corpus has more than 3500 definite nominals in it.

1.5.2. Analysis

All **definite nominals** in the corpus were identified together with their **antecedents** (the referents presupposed by the definite nominals for the assignment of a referent). The definite nominals were coded for the **expression** used, the semantic **relation** between anaphor and antecedent, and for the **distance** (by number of intervening sentences) between the nominal and the last mention of the antecedent if that was introduced textually

1.5.2.1. Definite Nominals

The following types of expressions have been counted as definite nominals:

1. definite pronouns, demonstratives, and full definite nominals;
2. proper names;
3. definite nominal ellipses (definite nominals with elided head);
4. adverbs like *herved*, "hereby" that have a nominal-like function and take the same kinds of antecedents as pronouns.

What these expressions have in common (besides being nominal) is that they are presuppositional with respect to the situation or text in which they occur; they can not be interpreted in their own right, but only by recourse to referents that are sufficiently salient for the discourse participants to retrieve them, either from the discourse itself, from the situation in which it takes place, or from general experience. More details about the types of expressions and their subcategories will be given in section 2.1 below

1.5.2.2. Antecedents

Antecedents are those previously mentioned discourse referents which are presupposed for the assignment of reference to the definite nominal currently being processed. Quite often a definite nominal is related to more than one antecedent: if it is used in reference to a part of some whole, it may at the same time, presuppose the previously mentioned whole, as well as another, also previously mentioned part of the same whole. In such cases the textually most recent antecedent is taken to be the presupposed antecedent.

1.5.2.3. Relations

Antecedents are not necessarily identical to the currently intended referent; a number of other relations besides identity, commonly summarized under the heading of bridging references, may serve to make a referent uniquely identifiable (Clark 1977). Also the currently intended referent may be uniquely identifiable for other reasons than previous mention. More details about the types of relations will be given in section 3.1 below

1.5.2.4. Distance

Distance was measured as the number of intervening sentences between the anaphor and the last mention of the antecedent. As noted above, a definite nominal

may be related to more than one antecedent: in that case the distance is measured to the textually most recent antecedent.

In cases where no antecedent has been mentioned, distance is of course irrelevant, and the slot has been left empty

One text quotes a Swedish book in the original. For reasons of consistency, it was decided to count the sentences in this quote when measuring the distance between definite nominals and antecedents, but otherwise leave the text out of the data, luckily, it does not contain antecedents of definite nominals in the surrounding text.

The following constructions have been counted as sentences:

1. sentences proper (with a finite verb with all obligatory constituents present):

   Planten er grålig, sølvglinsende, 50-100 cm høj med dybt fligede blade og nikkende, halvkugleformede kurve med gule blomster
   ('The plant is greyish, silvery, 50-100 cm tall with deeply lobed leaves and nutant, hemispherical baskets of yellow flowers.')

2. inquits (clauses that introduce quoted text); even though the quoted text is a constituent (direct object) of such a clause, the inquit is counted as a sentence, and the sentences in the quote are treated as independent:

   - *Kom herhen,* ***sagde hun myndigt*** *[ ].*
   ('- Come here, **she said authoritatively** [ ].')

3. sentential ellipses: segments of text that are not sentences or inquits, but marked off from surrounding text by punctuation marks, in cases where these do not mark off clauses from each other within a sentence:

   Stærkt duftende (især hvis man "nulrer" bladene mellem fingrene) og bittert smagende.
   ('Strongly fragrant (especially if one "rubs" the leaves between one's fingers) and bitterly tasting') - with a bitter taste, i.e.

This way of measuring accessibility is a crude one for a number of reasons. Most importantly, it measures directly only recency of mention and neither takes into account the topicality of the antecedent, the hierarchical orderings among sentences and constituents, or the varying permeability of boundaries between discourse segments as reflected in Discourse Representation Theory (Kamp 1981), in Grosz & Sidner's (1986) focus spaces or Fauconnier's (1985) mental spaces.

One should also be aware that when distance is measured as described here it may sometimes be exaggerated a little for two reasons: sentential ellipses count as sentences, even in cases where they would have been simply a constituent of a neighbouring sentence if the author had made a different decision about punctuation, and inquits as well as sentences in quoted text count as independent.

The major advantages of distance as a measure of accessibility are that is simple and direct, and therefore manageable even with large amounts of data, and that it has been widely used, so that comparison with other research is possible.

2. Grammatical Cues in Discourse Comprehension

2.1. Types of Nominals

Diderichsen (1966, § 91) (and similarly, Togeby 1993, § 17 & 23) characterizes nominals as constituents whose modifiers more closely describe or determine an object element specified by the head noun. The constituents of the nominal are ordered according to the parenthesis principle (constituents that modify all of the following ones are placed before them) and the weight principle ("heavy" constituents come last). By a coarse-grained analysis, there are two slots for premodifiers: determiners and descriptors and two for postmodifiers: one for adverbial indications of the situation or further circumstances, and one for "heavy" constituents, such as clauses and appositions.

So the full structure of the nominal in Danish has five slots, not always filled.

Determiner | Descriptors | Head | Adverbials | "Heavy" Constituents

The head may be a common noun (or nominal), a pronoun (or numeral used with the function of a pronoun), or a proper name. If the head is a definite pronoun, or a noun inflected for definiteness, premodifiers are not possible. Also, the head may be elided, and if the nominal is indefinite there is the further option of substitution. In the case of elision, there are in-between cases, in which a descriptor may have the function of head.

For the purposes of this study, definite nominals have been categorized at the first level by the type of expression used as head. In a Full Definite Nominal (FDNP, for short) the head is a common noun or nominal, and definiteness is indicated by a preposed determiner or a suffix on the head noun, FDNPs are further subcategorized by type of determiner for non-elliptical nominals, ellipses forming a category of their own. In a Pronoun the head is a pronoun, and definiteness is lexicalized, pronouns are further subdivided by lexical categories. In a Proper the head is a proper name, which is inherently definite. Proper names may have modifiers and preposed determiners, at least colloquially The subcategories are further described in the following sections.

2.1.1 Full Definite Nominals

Non-elliptical nominals are categorized by their determiners, and ellipses are a special category·

SUFFIXED: suffixed FDNPs are those in which definiteness is expressed by a suffix on the head noun, dependent on its gender and number This kind of expression is unambiguously definite and non-demonstrative, and premodifiers are excluded.

solen	('sun-DEF the sun')
planten	('plant-DEF the plant')

DISTAL. In a distal FDNP the determiner is preposed (as in English) and is the same as the definite pronoun and/or distal demonstrative *den*, inflected for the gender and number of the head, but without the oblique form, even in object position. In Danish (unlike Swedish and Norwegian) the head noun is never inflected for definiteness if there is a preposed determiner. In written language, distal FDNPs with further modifiers, especially with a descriptor, are ambiguous between definiteness and demonstrativeness; in spoken language, the determiner is stressed to yield the distal demonstrative. Without premodifiers, the FDNP is always demonstrative (and in spoken language, the determiner will be stressed), at least if there is no appeal to poetic license. This criterion may appear not to distinguish sufficiently, but it has the advantage of avoiding the subjectivity of relying on stress patterns imposed on written texts, and it is still possible to distinguish a subset within the category which is unambiguously demonstrative.

det øjeblik ('that moment')
den venstre arm ('the left arm')
de til familien særligt afsatte 'flader
('the for the family especially dedicated 'surfaces'
"the sending periods especially dedicated to family viewing")

PROXIMAL. In a proximal FDNP, the determiner is also preposed, and is the same as the proximal demonstrative *denne*, inflected for the gender and number of the head noun. Again, the head noun is not inflected for definiteness.

dette barn	('this child')
denne fine og demokratiske made	('this fine and democratic manner')

POSSESSIVE In a possessive FDNP, the determiner is preposed. It is a full nominal or pronoun in the genitive, or a possessive pronoun. Possessive pronouns (but not the other possessive determiners) are inflected for the person and number of their referent, as well as the gender and number of the head noun. If there are other premodifiers than the possessive determiner, the head may be a full nominal with a preposed distal determiner. In a possessive FDNP the distance between the antecedent and intended referent will always be zero, and the relation is never one of identity, because the antecedent needed for grounding the referent expressed by the head noun is expressed by the determiner.

skomagerens dødsleje	('the shoemaker's deathbed')
Annas far	('Anna's father')
hans sjæl	('his soul')
deres rigtige mor	('their real mother')

ELLIPSIS To avoid the confusion of having to decide about fuzzy cases, all FDNPs without a head noun have been counted as elliptical, even though it may certainly be argued that there are cases in which a Descriptor has the function of head. The criterion is intended to identify a particular kind of expression, independent of its

semantics or pragmatics. Determiners in elliptical nominals are always preposed (since there is no head noun to attach a suffix to) and are inflected for the gender and number of the elided head noun, if they are of a category that can be so inflected, just as in full nominals. If there is no premodifier, pronouns are used rather than elliptical forms, as evidenced by the fact that oblique forms are obligatory in object position, if they are possible. Unlike English, Danish has no special form of the possessive pronouns when they are used in this function (corresponding to *mine yours* etc.), but the elided head does leave a trace, because Danish possessive pronouns are inflected for the gender and number of the head, as well the person and number of their antecedent.

det berømte [] i Hitchcocks Psycho (the elided noun is *hus* ('house')),
('the famous [one] in Hitchcock's Psycho')
den døende ('the dying [person]')
mit ('my-NEUT(+SING), mine')

Summary of Definite and Demonstrative Determiners in Danish

	common	neuter	plural
SUFFIX	*-en*	*-et*	*-ne*
DISTAL	*den*	*det*	*de*
PROXIMAL	*denne*	*dette*	*disse*
POSSESSIVE	genitive nominal; possessive pronoun		

POSTMODIFIERS. Nominals may contain postmodifiers, such as adverbials (very often prepositional phrases), clauses (often with *som, der, at*), or appositions. Postmodifiers serve to specify the referent beyond the specification derived from the head noun and the premodifiers. Such further specifications may be used to characterize referents which are already known (attributive postmodifiers), or they may be used to make intended referents uniquely identifiable for the hearer by narrowing down the set of possible referents to one member (referential postmodifiers). Or unique identifiability may be achieved by explicit mention of the intended antecedent in the postmodifier, almost as with a possessive determiner.

clauses *det hellige liv **der er vakt i den døende***
('the holy life which is evoked in the dying [man]')

*den tanke, **at Anna Bak skulle være udvalgt til at føde den nye Messias***
('the thought, that Anna Bak had been chosen to bear the new Messiah')

adverbials *tanken **om en evighed uden alkohol***
('the thought **of an eternity without alcohol**')

apposition *fiskerlejet Lavnæs*
('the fishing village **Lavnæs**')

2.1,2. Definite Pronouns

Like English, but unlike German and French, the Danish pronoun system distinguishes between personal and non-personal referents so that the choice of pronoun used to refer to a singular, 3rd person, personal referent depends upon the "natural gender" (sex, really) of that referent: *han, hun* ('he, she'). But like German and French, and unlike English, Danish has grammatical gender also: the choice of pronoun used to refer to a singular non-personal referent depends upon the grammatical gender of the word for that referent: *den, det* ('it' - common and neuter gender, respectively). In the plural these oppositions are extinguished. the same pronoun is used with personal as well as non-personal, common or neuter, referents: *de* ('they').

It should be noted also that the difference between the 3rd person, non-personal definite pronouns and the distal demonstratives is just that the latter are stressed. Diderichsen (1966) views them as being "between the two classes" of personal pronouns and demonstratives. Like the definite/distal determiners, they have been counted as one category, *distal*, in order to avoid the subjectivity of distinguishing between them by relying on intonations imposed upon written texts. This means that only those pronouns that are restricted to personal referents have been counted as *personal.*

Definite Pronouns

	personal			**reflexive**	**possessive**
	subject	oblique	genitive		
1 sing.	jeg	mig			min/mit/mine
2. sing.	du	dig			din/dit/dine
3. sing male (person) female	han hun	ham hende	hans hendes	sig	sin/sit/sine (reflexive also)
1. plural	vi	os	vores		vor/vort/vore
2. plural (honorific)	I De	jer Dem	jeres Deres		

Unlike English, but like German, Danish has a 3rd person *reflexive* pronoun, *sig*, which is used if the intended referent is the "logical subject" of the clause; if it is not the oblique forms of the 3rd person pronouns are used. And (unlike English as well as German) Danish has a 3rd person, singular possessive pronoun, *sin*, which is reflexive and distinct from the genitives of the corresponding pronouns which are used non-reflexively It is reported that *sin* is increasingly used with plural antecedents, and indeed one of the text samples in the corpus does this. The others

adhere to the usually recommended usage of restricting *sin* to the singular A couple of instances of *hinanden* ('each other') have been counted as reflexive.

Possessives differ from genitives in that they are inflected for the gender and number of the head of the nominal in which they function as determiner

Danish has *distal* and *proximal* demonstratives, inflected for the gender and number of the intended referent. The reflexive pronouns, oblique: *sig* and possessive: *sin,* are used as with the definite pronouns, always with reference to the "logical subject" And a few instances of *begge, alle, samme, sadan, slig, selv* ('both, all, same, such, such, self') in their pronominal use have been counted as distal pronouns.

Demonstratives

		subject	oblique	genitive
distal	singular	den/det		dens/dets
	plural	de	dem	deres
proximal	singular	denne/dette		dennes/dettes
	plural	disse		disses

In spoken language, demonstrativeness is often expressed by combinations of the demonstratives with *her* ('here') and *der* ('there'): *den her* ('that here'), *den der* ('that there'), *denne her* ('this here'); outside of this construction, the proximal demonstrative is used almost only in writing.

Finally, adverbials compounded from *her* or *der* and a preposition may substitute for prepositional phrases, but commonly, *her-* and *der-* are viewed as having a kind of pronominal reference. Here, they have been counted with the pronouns proper as a special category· *adverb*

Like FDNPs, pronouns may have attributive or referential postmodifiers.

2.1.3. Proper Names

The referents of proper names are assumed to be always uniquely identifiable, at least in principle, because they specify a set with just one member This makes it difficult to determine whether a previous mention is important or not. Sometimes other relations than exophoric or identical reference might have been considered. If, e.g., one or more names of European countries have been mentioned, one might see the next one as being related in some way In a very few cases, proper names have been counted as having bridging references. Otherwise, they are counted as having exophoric reference on first mention, and as being identical, i.e. having the same reference on later mentions. Some definite nominals always or nearly always have uniquely identifiable referents, because there is in practice only one candidate referent. There is only one sun, moon, or queen - Queen Margrethe II of Denmark, of course - and therefore expressions like *solen* ('the sun'), *manen* ('the moon'), and

dronningen ('the queen') may approach the status of proper names. On the basis of form, such nominals have been counted as FDNPs, however

Anna Bak	('Anna Bak')
Storbritannien	('Great Britain')

In written language, proper names do not usually have premodifiers or referential postmodifiers. Colloquially, this is different, especially in cases where the hearer fails to identify the intended referent, or the speaker anticipates that he might. In the corpus there are no examples of this.

2.2. Empirical Results

Table 1 shows the frequency of the major types of expression (29% pronouns, 59% full definite nominals, and 12 % proper names) and their distribution over different antecedent relations.

Table 1.
Frequency of Definite Nominals by Expression Type and Antecedent Relation

N = %	TOTAL	PRONOUNS	FULL NOMINALS	PROPER NAMES
No Antecedent	969 = 26	288 = 27	407 = 19	274 = 60
Antecedent	2696 = 74	782 = 73	1733 = 81	181 = 40
IDENTITY	1690 = 46	757 = 71	754 = 35	179 = 39
BRIDGING	1006 = 27	25 = 2	979 = 46	2 = 0
Total	3665 = 100	1070 = 100	2140 = 100	455 = 100

26% of the definite nominals in the corpus do not have textually introduced antecedents, i.e. their reference does not depend in any direct way on referents introduced in the previous discourse. As one might expect, this is the norm for proper names, but it is also quite prominent for pronouns and full nominals. Most nominals without explicitly mentioned antecedents are exophoric, but a few idiomatic expressions and expressions with generic reference, have been put into this category also.

27% of the total number of definite nominals, nearly all of them full nominals, require bridging inferences for reference assignment, i.e. they can be assigned reference only by recourse to some previously mentioned antecedent, but the referent assigned is related to the antecedent in some other way than identity

Of those full nominals that do have textually explicit antecedents, more than half require bridging for the assignment of reference, while only a very small proportion of the pronouns and proper names have intended referents that are not identical to the presupposed ones (antecedents).

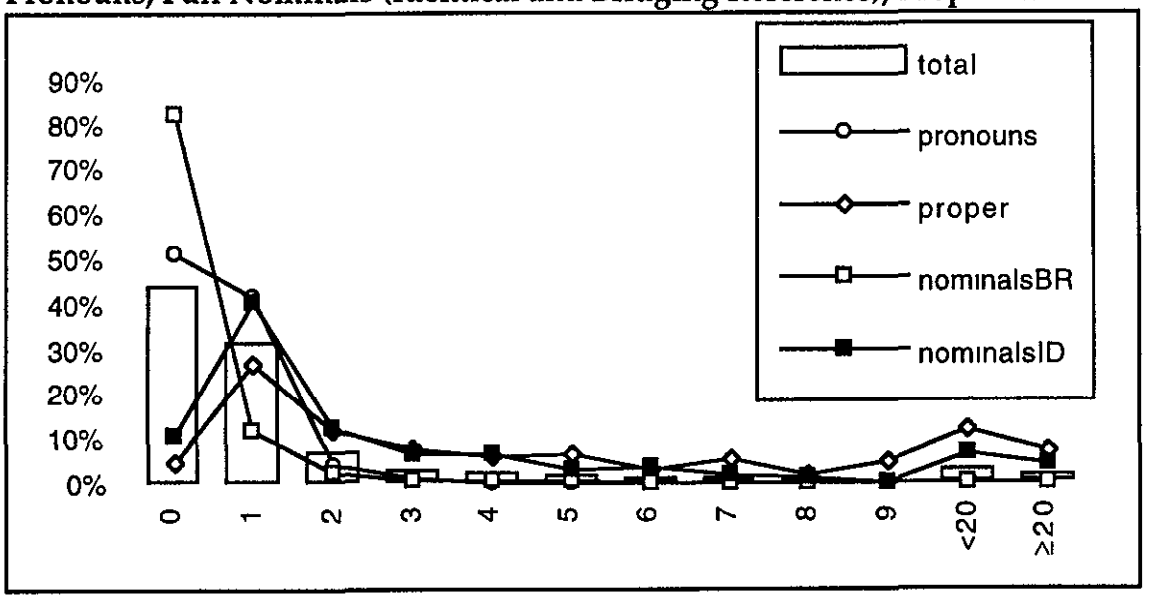
Figure 1 shows the distribution of the different types of definite nominals with textual antecedents over the distances between the definite nominal and the last mention of the antecedent.

Nearly all pronouns (94%) have their antecedents in the same or the immediately preceding sentence, and most of them are within the same sentence; 7 sentences away is the longest distance to the antecedent for any pronoun in the corpus.

Proper names with antecedents predominantly find their antecedents in the immediately preceding sentence (27%), and not within the same sentence (5%).

The scores for 2 to 5 sentences away are all higher than for the same sentence. And the tail is very long: 35 of the proper names with antecedents (19%) find them 10 or more sentences away, 13 of them (7%) are beyond 20; and for all distances beyond the preceding sentence the proportion of proper names never go below the other categories. Apparently the upper limit for the distance between a proper name and its antecedent is the length of the text. But one should keep in mind that previous mention is never required for proper names: they can always be assigned reference without recourse to textual antecedents. Nearly all of the proper names with explicit antecedents simply repeat the expression originally used.

Figure 1. Distribution of Definite Nominals over Distances: Pronouns, Full Nominals (Identical and Bridging Reference), Proper Names



Like proper names, full definite nominals with identical reference predominantly find their antecedents in the immediately preceding sentence (41%), and **not** within the same sentence (11%). I.e., almost 50% of the full nominals with identical reference gap distances beyond the preceding sentence, the score for 2 sentences away is higher than that for same sentence, and the score for 3 or 4 sentences away is almost on the same level as that for same sentence. And there is a very long tail: 83 (11%) of the full non-bridging nominals have antecedents that are 10 or more sentences away, 34 (5%) of them are beyond 20. The upper limit appears to be the length of the text as for proper names, but the longer distances are far less frequent with full nominals than with proper names.

In contrast, full nominals that require bridging for reference assignment behave like pronouns in some ways: their antecedents are usually close: 94% within the same or the immediately preceding sentence and most of them within the same sentence. If one disregards nominals with possessives as determiners, in which the antecedent for the referent of the head noun is in the determiner and nominals with referential modifiers that always require bridging, and always have their antecedents in the same sentence, that figure drops to 85%, with same sentence still

prevailing, but not so dominantly But the tail is longer than for pronouns: 5 instances, just over 0.5% , find their antecedents at a distance of 10 or more sentences, 3 at 10 sentences, and 2 at 19 So the tail is much shorter than for proper names and non-bridging full nominals, and the proportion of instances in the distances beyond the preceding sentence is consistently below that for nominals with identical reference. There does appear to be an upper limit, even if it is somewhat fuzzy

2.2.1. Full Definite Nominals

Table 2 shows the frequency of the different types of full definite nominals with different antecedent relations. The overall picture is that full nominals are not choosy about antecedent relations, most types are used quite a lot with any type of relation. The obvious exceptions are nominals with proximal and possessive determiners.

Table 2:
Frequency of Full Definite Nominals
by Expression Type and Antecedent Relation

N = %	TOTAL	SUFFIX	DISTAL	PROXIMAL	POS-SESSIVE	ELLIPSIS
No Antecedent	407 = 19	236 = 20	122 = 28	13 = 25	10 = 2	26 = 36
Antecedent	1733 = 81	917 = 80	313 = 72	40 = 75	416 = 98	47 = 64
IDENTITY	754 = 35	560 = 49	130 = 30	40 = 75	0 = 0	24 = 33
BRIDGING	979 = 46	357 = 31	183 = 42	0 = 0	416 = 98	23 = 32
Total	2140 = 100	1153 = 100	435 = 100	53 = 100	426 = 100	73 = 100
Total	2140 = 100	1153 = 54	435 = 20	53 = 2	426 = 20	73 = 3

Only 10 of the nominals with possessive determiners do not have antecedents (and they are all idiomatic expressions). None have identical reference because the antecedent is always in the determiner The function of the possessive is to indicate that some relation exists between the two referents that are tied together by the syntactic construction, and therefore they cannot be identical. Ownership is but one of the possible relationships.

For the proximal nominals this picture is reversed: all that have antecedents have identical reference because of the deictic function of proximals.

The three remaining groups of suffixed, distal and elliptical nominals all spread across the antecedent relations. But there are differences.

Suffixed full definite nominals are used less without antecedents and more with identical reference than the distal ones.

One reason may be found in the function of distal demonstrative nominals. 65% of the distal nominals without premodifiers (the subset that can safely be categorized as demonstrative, and not just definite) have referential postmodifiers, as opposed to 13% of those with premodifiers, and 7% of the suffixed ones. One should keep in mind, though, that the criterion of no premodification in a nominal with a distal determiner is sufficient, but not necessary, for demonstrativeness: the remaining set will consist of demonstrative as well as definite nominals, all with premodifiers, and some with postmodifiers also.

Many of the elliptical nominals (defined by the syntactic criterion of having no head noun) without antecedents have a descriptor for head A significant majority of the rest have bridging references, most of them with a set-element relation, because ellipses are designed for contrast. Because an elliptical nominal has only a premodifier, but no head noun, its lexical specification is incomplete and some part of that must be retrieved from an antecedent. If it is also definite, it presupposes a referent as well as a specification, most often in a set-element relation: the antecedent is a set, and the intended referent is picked out from that set by means of an addition to the specification of the antecedent. For the retrieval of antecedents, ellipses depend upon semantic cues that are almost as schematic as with pronouns: gender and number, exhibited by the determiner, plus the possibility of adding the descriptor in the ellipsis to the specification by which the antecedent was introduced. This abstractness in the specification restricts ellipses in their capacity for retrieving remote antecedents.

Figure 2:
Distribution (%) of Types of Full Definite Nominals over Distances to Antecedent

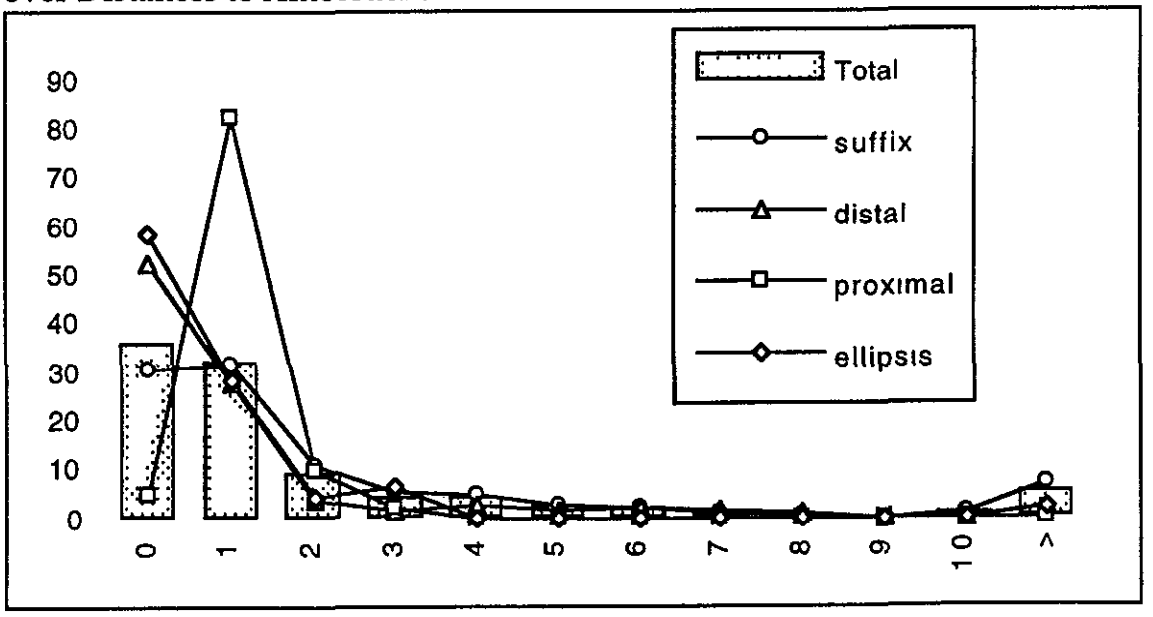


Figure 2 shows the distribution of the different types of full definite nominals over distances to the antecedent. Because of the syntactic construction of possessive nominals, both referents are mentioned in the same sentence and the referential distance is always zero. Therefore they have been left out of this figure.

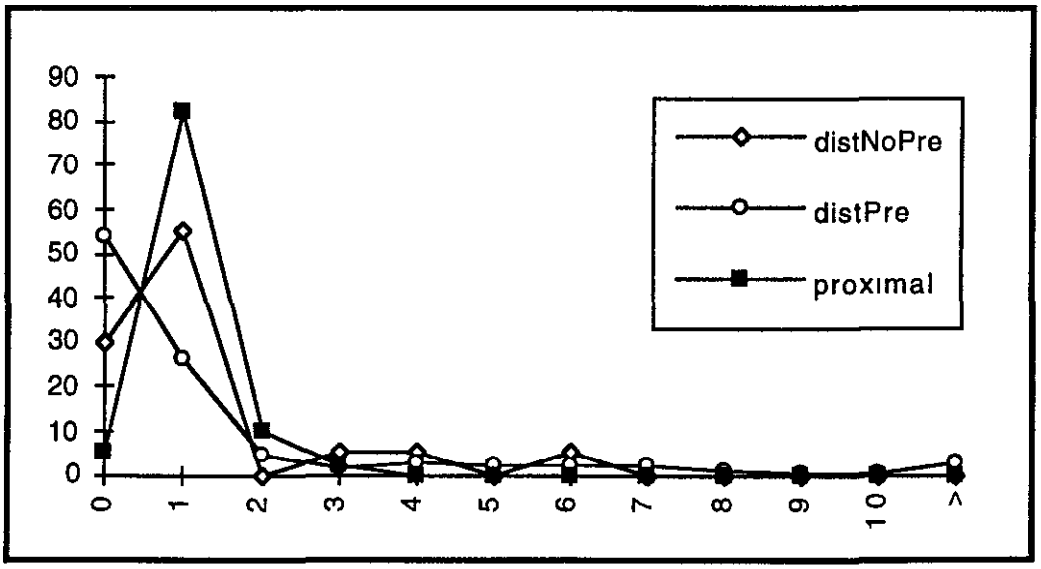
The two small groups of proximal and elliptical nominals are both characteristically different from the total and from each other The proximals show a marked preference for antecedents 1 sentence away and none retrieve their antecedent more than 3 sentences back. Ellipses predominantly find their antecedents in the same sentence, and only one retrieves its referential antecedent more than 3 sentences away, at 11. But in this case the antecedent for the missing specification is not the same as the referential antecedent. It is in the same sentence, so the search for a referential antecedent is performed with a full specification as it would have been with a non-elliptical nominal:

Trækketiden er den foran angivne.
('The drawing time is the [one] stated above').

Since more than half of the full definite nominals have suffixed heads it is hardly surprising that their distribution over distances is like the total for nominals. Suffixed nominals have more retrievals that are more than one sentence away than distal nominals.

In Figure 3, distal nominals without premodifiers (those that are certainly demonstrative, not just definite) have been separated out. They turn out to be more like the proximal demonstrative nominals than like the other distal or suffixed nominals: A lot more of them retrieve their antecedents in the immediately preceding sentence, a lot less of them go beyond that, and the maximum referential distance found in the corpus is 6 sentences away

Figure 3:
Distribution of FDNPs with Proximal Determiners and Distal Determiners with and without Premodifiers over Distances to Antecedent



2.2.2. Pronouns

Table 4 shows the frequency of the different types of definite pronouns with different antecedent relations. The most notable feature is the almost total absence of reference assignment with bridging inferences. Only 2% of all definite pronouns in the corpus require bridging inferences, and about three quarters of those have referential modifiers, that gives the antecedent or the relation or both explicitly

Table 4:
Frequency of Definite Pronouns by Expression Type and Antecedent Relation

N = %	TOTAL	PER-SONAL	POSSES-SIVE	DISTAL	PROX-IMAL	REFLEX-IVE	ADVERB
No Ante-cedent	288 = 27	217 = 57	37 = 39	24 = 5	0 = 0	9 = 11	1 = 4
Ante-cedent	782 = 73	164 = 43	57 = 61	451 = 95	15 = 100	73 = 89	22 = 96
IDENTITY	757 = 71	164 = 43	55 = 59	435 = 92	12 = 80	71 = 87	20 = 87
BRIDGING	25 = 2	0 = 0	2 = 2	16 = 3	3 = 20	2 = 2	2 = 9
Total	1070 = 100	381 = 100	94 = 100	475 = 100	15 = 100	82 = 100	23 = 100
Total	1070 = 100	381 = 36	94 = 9	475 = 44	15 = 1	82 = 8	23 = 2

Many of the personal and possessive pronouns without antecedents are, of course, the exclusively deictic 1st and 2nd person pronouns. The 9 reflexive pronouns without antecedents are all in idiomatic expressions. The two instances of bridging with reflexive pronouns are the reciprocal *hinanden* ('each other') with a dialogue as antecedent.

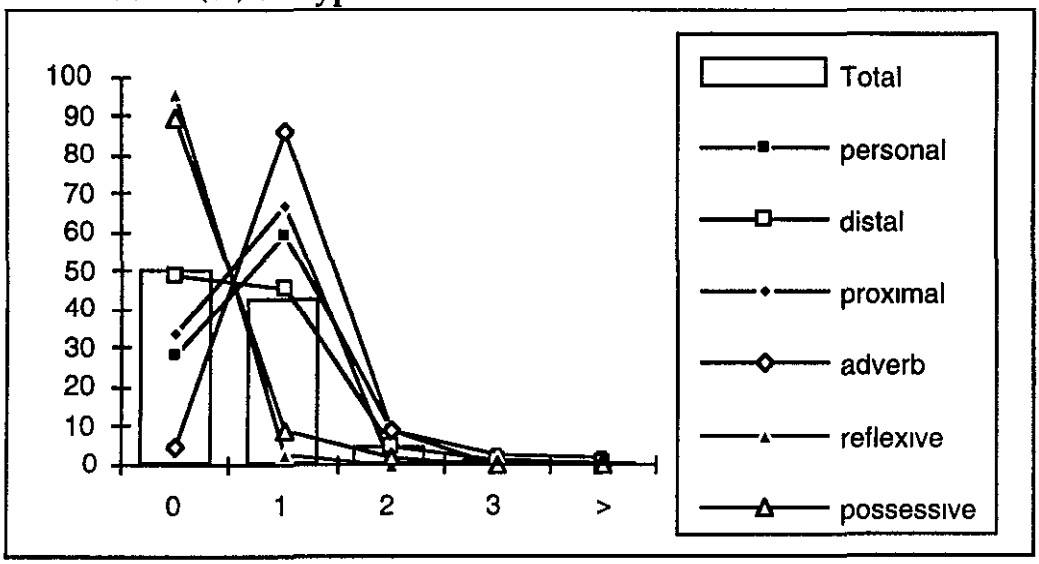
In Figure 4 is shown the distribution of the different types of pronouns over referential distances. As noted above, pronouns cover short distances: 93 % have antecedents in the same or the preceding sentence, and the longest referential distance found is 7 sentences away

But there are differences between the types. Reflexive and possessive pronouns retrieve their antecedents within the same sentence by definition, since possessive pronouns that may have antecedents in the text (3rd person only) are also reflexive. The few instances that are counted as going beyond the same sentence are all found in elliptical sentences.

The adverbs and proximal demonstratives, that both depend on deixis, find most of their antecedents in the preceding sentence; proximals do not go beyond that, and adverbs do not go beyond 2 sentences away

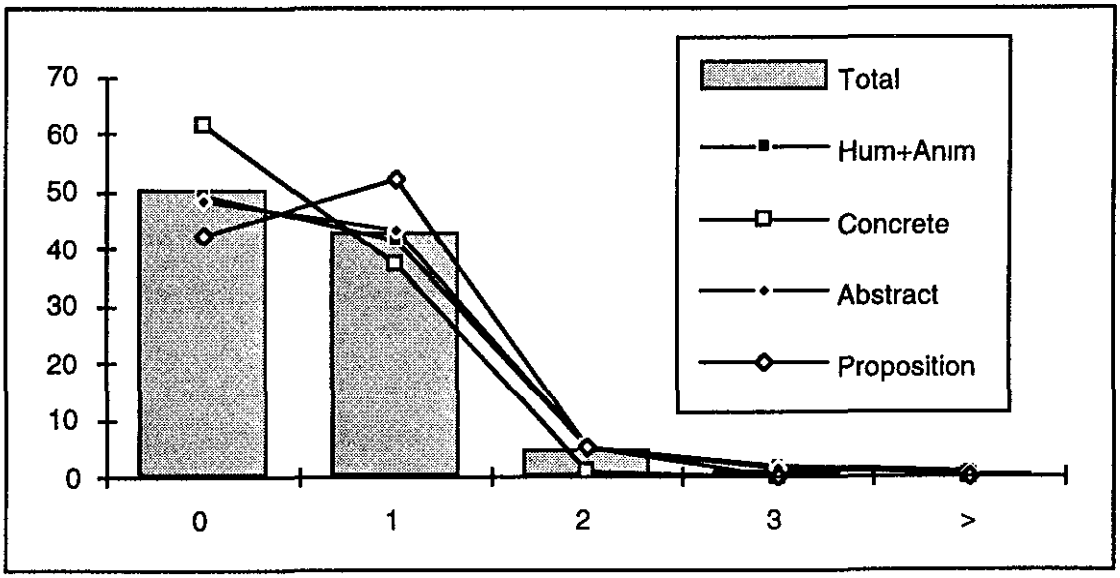
The only types that retrieve antecedents more than 2 or 3 sentences away are the personal and distal pronouns, personal pronouns apparently a little more than distal ones.

Figure 4:
Distribution (%) of Types of Pronouns over Distances to Antecedent



In a Swedish corpus, Fraurud (1988) looked at the distribution of pronouns with human and animate antecedents vs. pronouns with object antecedents (concrete and abstract) - leaving out the computationally difficult fact/proposition antecedents - and found that the majority (about 90%, in this study it is 93%) had their antecedents within the same or the preceding sentence, and that human antecedents were more durable than object antecedents.

Figure 5:
Distribution of Pronouns with Different Antecedent Types over Distances to Antecedent



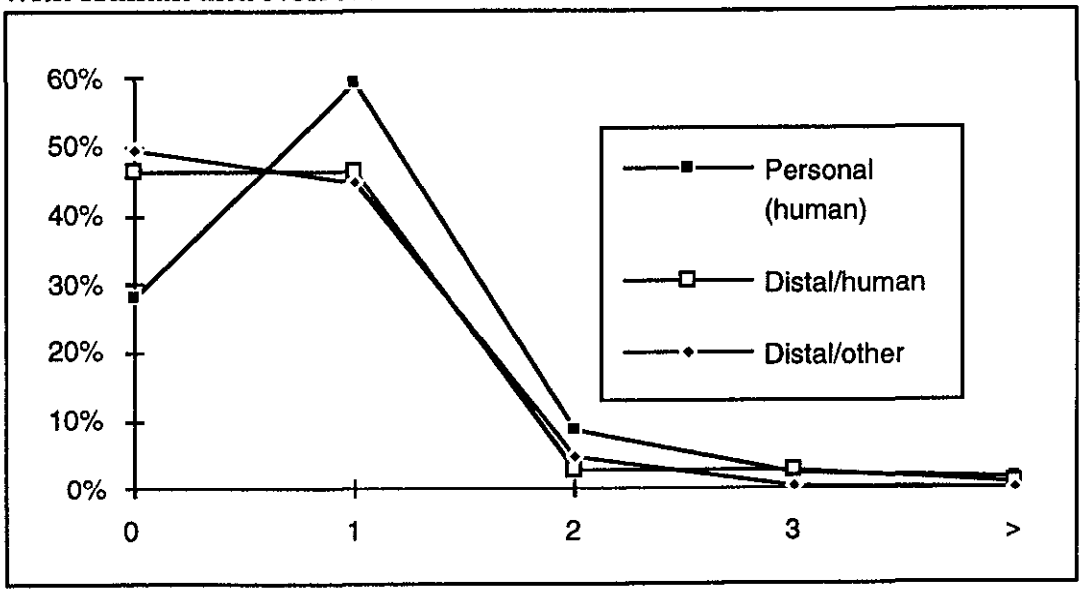
The present study showed a very similar distribution. But Fraurud also suggested that a more fine-grained animacy hierarchy (*human* > *animate* > *concrete* > *abstract*)

should be tested with the expectation that the scope of antecedents would reflect this hierarchy For the purposes of the present study *proposition* was added in as the lowest category, and, since there turned out to be only 3 pronouns with animate antecedents, they were put together with the human antecedents. The result is shown in Figure 5.

Obviously the expectation that referential distances should be shorter with lower animacy does not hold for the fine-grained hierarchy in the corpus examined in this study Propositional antecedents (the lowest animacy in the hierarchy) is notably different from the rest, with a preference for antecedents in the preceding sentence. Only 2 concrete antecedents are retrieved 2 sentences away, and none beyond that, which gives a mean referential distance that is far below the others (0.41 for concrete antecedents, as opposed to 0.64, 0.65, and 0.63 for human/animate, abstract, and propositional antecedents, respectively).

Personal pronouns are used only with human (or humanoid, like some people's dogs) referents, while distal pronouns are less choosy about their antecedents. Figure 6 shows the distribution over distances of personal pronouns and of distal pronouns with human antecedents as well as antecedents with lower animacy

Figure 6:
The Distribution of Different Types of Pronouns with Human and Non-Human Antecedents over Distances to Antecedent



The distal pronouns with human antecedents are mostly plural, the exceptions are a few cases in which the singular, neuter pronoun *det* ('it') is used with antecedents that were introduced by the neuter nouns *menneske* ('human being'), and *barn* ('child').

It may be that there is a slight effect of the animacy of the antecedent: distal pronouns with human antecedents actually do tend to find a few more of them in the preceding sentence than in the same, while those with antecedents of lower

animacy find a few more in the same sentence than in the preceding one; and for longer distances there are more human antecedents than others. But the major difference by far is between the personal and distal pronouns: far more of the personal pronouns have their antecedents in the preceding sentence and far fewer have them in the same sentence.

The explanation is that the lexical specification of the personal pronouns in question (3rd person only) is less schematic than that of the distal pronouns. The personal pronouns specify not only that their referents are human, but also their "natural gender" - or sex. Distal pronouns take all sorts of referents, depending only on the grammatical gender and number of an appropriate expression for the referent, not on the properties of the referent itself as they would be indicated by the type specifications carried by head nouns and their modifiers in a full nominal.

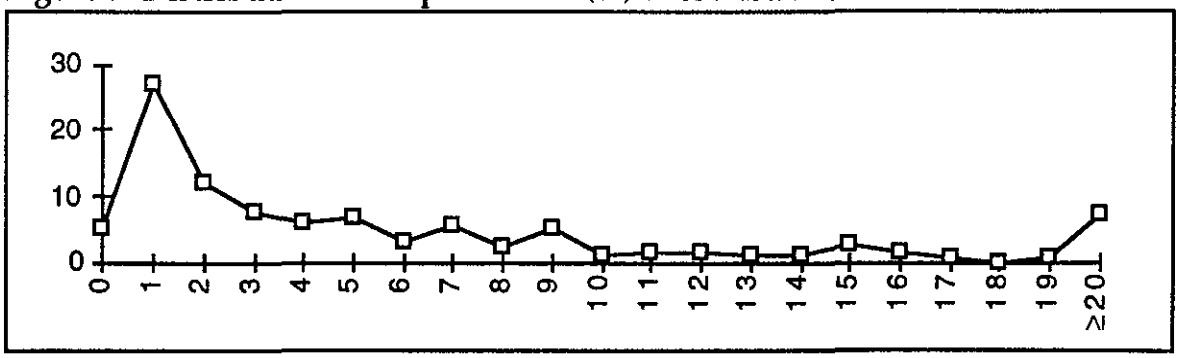
2.2.3. Proper Names

Since proper names have not been further subdivided, the frequency table (Table 5) and distribution chart (Figure 7) for them simply repeats what was given in the introductory overview of the data in this section.

Table 5: Frequency of Proper Names by Antecedent Relation (N = %)

	TOTAL	No Antecedent	Antecedent
IDENTITY	453 = 100	274 = 100	179 = 99
BRIDGING	2 = 0	0 = 0	2 = 1
TOTAL	455 = 100	274 = 100	181 = 100

Figure 7: Distribution of Proper Names (%) over Distances to Antecedent



2.2.4. Summary of Expression Cues

Perhaps the most surprising finding (considering the literature) is the negative one: Categories of expressions are not (not even approximately) tied to mutually exclusive intervals of referential distances. Some exhibit a maximum distance, but up to their maximum, all types are used at any distance. Besides the possibility of a maximum, the main difference between the categories is in the distributions over distances: whether they prefer finding their antecedents in the same or the

preceding sentence, and if the preceding sentence is preferred, whether the same sentence or 2 sentences away is the second choice.

Other interesting findings are that more than half of the full nominals require bridging for reference assignment, and that the distribution of referential distances covered in bridging is very different from the one for identical references. Nominals with bridging references exhibit a strong preference for antecedents in the same sentence and, more generally, within short distances, and while it is uncertain whether a real maximum distance can be determined, it is noteworthy that only 2 instances (far less than 1%) go beyond 10 sentences (both at 19) as opposed to 73 (10%) with identical reference.

Table 6: Summary of Expression Cues

	PRIMARY PREFERRED DISTANCES	SECONDARY PREFERRED DISTANCES	MAXIMUM DISTANCE
PROPER	1	2 - 5	∞
FULL NOMINALS	id: 1 bridge: 0	id: 2, 0 bridge: 1	id: ∞ bridge: 19
suffix	id: 1 bridge: 0	id. 2 > 0, 3, 4 bridge: 1	id: ∞ bridge: 19
distal	id: 1 bridge: 0	id: 0 bridge: 1	id: ∞ bridge: 19
premodifier	1	0	∞
no premodifier	1	0	6
proximal	1	2 & 0	3
possessive	0	0	0
ellipsis	0	1	3 (11)
PRONOUNS	0	1	7
personal	1	0	7
possessive	0	1	2
distal	0 & 1	2	6
proximal	1	0	1
reflexive	0	1	3
adverb	1	0 & 2	2

Proper names can be used at any referential distance. Like the other categories they show a preference for short distances, but they may cover very long distances also. The length of the text appears to be the limit. They are, however, most often used

with referents that have not been mentioned before, and they are intrinsically definite, i.e. definiteness does never depend on previous mention only Therefore, antecedence may not be a real issue with proper names.

Pronouns retrieve textual antecedents at short referential distances only (94% in the same or the preceding sentence; the maximum is 7 sentences). They are quite often used with reference to the speech situation, especially of course 1st and 2nd person pronouns. Only few pronouns require bridging inferences for reference assignment, and most of those that do have referential modifiers to make the task easier.

Like proper names, full definite nominals may be used with long or short referential distances, apparently with the length of the text as the limit. But a smaller proportion of them cover longer distances than proper names. Like pronouns, they are quite often used with reference outside the text, but rather more with reference based on general knowledge.

Adverbs, proximal pronouns and proximal full nominals show a strong preference for retrieving their antecedents in the preceding sentence, and demonstrative full nominals, in contradistinction to most other types of full nominals have a maximum referential distance: for the distal demonstrative nominals (the subset without premodifiers) it is 6 sentences and for the proximals it is 3 sentences.

Elliptical nominals prefer same sentence and (with one exception in which the antecedent for the specification is different from the referential antecedent, and much closer) have referential antecedents within 3 sentences.

2.3. Discussion

Similar or comparable results have been reported from other studies, some of which are at least partly based on distance measures (Ariel 1988, 1990; Givon 1989, 1992a, 1992b; and Fraurud 1986, 1987, 1988a, 1988b), others on subjects' ratings of the cognitive status of referents (Gundel et al. 1988, 1989, 1990, 1993). Details of the findings differ, however, and the theories that are proposed to account for the data are certainly very different.

Ariel sees the different types of definite expressions as markers of accessibility (or 'cost' of cognitive processing) on a continuous scale and argues strongly against the "geographical" view that relates the types to the three knowledge sources available to the hearer: textual, situational, and encyclopedic knowledge. Givon views the grammatical constructions in question as discrete mental processing instructions, wants to do away with scalarity, and presupposes that the hearer can and must determine the knowledge source on the basis of grammatical cues. Gundel et al. establish a hierarchy of cognitive statuses for referents and discuss its relations to expressions in terms of Gricean maxims.

To some extent, the differences in the findings appear to be related to differences in the corpora that have been studied: they are apparently quite diverse with respect to the genres and discourse functions included, and they are certainly not sufficient large to be representative of language use in general. Differences between languages, and between the spoken and written modes of language use appear to be of importance as well. Differences in the methods and measures applied in different studies may, of course, also have influenced the findings; and the different theoretical interests may have imposed some bias not only upon the methods and measures, but also on the selection of results presented as well as the importance they are credited.

2.3.1. Markers of Accessibility

Ariel (1988, 1990) argues against a "geographic" view that sees the different forms of definite nominals as specialized for the retrieval of referents from one of the different knowledge contexts available to interlocutors: textual, situational, and encyclopedic knowledge. Rather, she claims, the different forms are markers of accessibility, each associated with a different degree of accessibility (or activation) of mental entities in the representation of discourse, irrespective of their source in "geographically" different locations in memory

The markers "form one continuous scale" from low (marked by lexically rich forms such as proper names and full definite nominals), through intermediate (demonstrative pronouns and full nominals with demonstrative determiners) to high accessibility (marked by lexically poor forms such as pronouns and gaps). The scale of accessibility markers is quoted in Table 1 below The degree of accessibility signaled by each marker is defined relative to its neighbours on the scale, so that:

> "An addressee is instructed to retrieve a mental representation which may be characterized by reference to the individual features associated with it ('wise', 'short'), but always also with a feature establishing its current Accessibility to him. ( ) various types of referring expressions, then, each represent different sets of instructions for the search process. We could almost say that they represent different 'price tags', indicating the processing effort (i.e. cost) involved in the retrieval of the intended entity " (Ariel 1990, p. 16).

The empirical basis for the coarse-grained distinctions in Ariel's scale between markers of low, intermediate, and high accessibility are measures of accessibility based on a four-way distinction between distances (*same sentence, previous sentence, same paragraph, across paragraph*). For the more fine-grained distinctions between expressions and the rankings between them, other criteria are used. The argument for having Long Definite Descriptions lower on the scale than Short Definite Descriptions, e.g., is based on the "geographic" view that Ariel otherwise rejects: a much larger proportion of long nominals retrieve their antecedents from encyclopedic and situational knowledge than from the text, and vice versa.

Table 1. Accessibility Marking Scale (Ariel 1990: 73)

	/\	LOW ACCESSIBILITY (lexically rich markers)
a.	|	Full name + modifier
b.	|	Full ('namy') name
c.	|	Long Definite Description
d.	|	Short Definite Description
e.	|	Last name
f.	|	First name
g.	|	Distal demonstrative + modifier
h.	|	Proximal demonstrative + modifier
i.	|	Distal demonstrative (+ NP)
j.	|	Proximal demonstrative (+ NP)
k.	|	Stressed pronoun + gesture
l.	|	Stressed pronoun
m.	|	Unstressed pronoun
n.	|	Cliticized pronoun
o.	|	Extremely High Accessibility Markers
	|	(gaps, incl. pro, PRO and *wh* traces, reflexives, agreement)
	\/	HIGH ACCESSIBILITY (lexically poor markers)

Generally speaking, the scale corresponds to the results one gets from ranking definite nominals by mean distance to textually introduced antecedents (Givon 1992b, see Table 2). But for several reasons, it is not possible to uphold such a fine-grained scale of mutually exclusive grammatical markers of accessibility

Grammatical devices, as Givon notes, are discrete, at least in the sense that they involve selection from closed classes of grammatical elements. But the markers in Ariel's scale do not form a closed class of discrete elements: There are, e.g., no restrictions on the number and size of modifiers in nominals that will prevent the introduction of ever finer grades in the lengths of expressions. Therefore the class of accessibility markers may be extended arbitrarily, and the elements are not discrete. The difference between a Short Definite Description (with one or two content words) and a Long Definite Description is not one that can mark or signal the accessibility of the intended referent in the manner of a price tag.

More specifically, the length or "modifiedness" of a nominal is not a feature that can form the basis for rejecting a referent which is proposed in the search for antecedents. If an antecedent is proposed that matches the lexical specification carried by a definite nominal, it will be assigned as the referent of that expression, irrespective of the length of the nominal or the cost of cognitive processing. An early match is as good for a long or modified nominal as a late one, and with a short or unmodified nominal, the search must continue until a proper match has been found so that a referent may be assigned to the expression. If a speaker violates Gricean principles by being too wordy or too specific, the hearer may experience her as annoying, impolite or boring, but he will not be prevented from assigning reference to the expression until the cost of processing meets the 'price' on the 'tag'

If mean referential distance is used as a measure it does indeed yield a difference between short and long nominals. Givon quotes the mean referential distance for the two "gap-irrelevant devices" that are comparable to Ariel's short and long definite descriptions: for unmodified DEF nouns it is 7.0 clauses and for modified DEF nouns it is 10.0. But the distributions are nowhere near categorial, and there is considerable overlap between them, which is the reason for Givon's characterization of the devices as *gap-irrelevant*: 25% of the unmodified nominals are at 1.0, 35% between 5 and 19, and 40% at 20+, while 55% of the modified ones are between 5 and 19, and 45% at 20+ (cf. Table 2).

Ariel's own findings show that, while the distribution profiles for different types of expression certainly do differ, it is also evident that there is considerable overlap between them, and that there are considerable differences between texts or text types. On top of that, my own findings show that for some combinations of types of expression and antecedent relation there is no maximum referential distance (or the maximum exceeds the length of any of the admittedly fairly short texts and excerpts in the corpus).

Because of this lack of a maximum (which is not evident in Ariel's or Givon's data because their measures impose a maximum on the data: *across paragraph*, and *20+ clauses*, respectively), the mean referential distance for the categories in question far exceeds the mode (the most typical/frequent distance), which means that the mean is misleading as a characterization of the distribution. In fact, distributions that are very similar in those shorter distances that cover the main bulk of the data

for all types of expressions, may have quite different means because of differences in the frequencies of very long distances.

The overlap in the distances actually covered and the absence of a maximum distance shows that the difference between otherwise unmarked long and short full nominals or proper names is indeed "gap-irrelevant", in spite of the differences in their mean referential distances. While the differences in the mean referential distances for different types of expression (not just long and short nominals) certainly do require some explanation, the overlap in the distribution indicates that the function of the expressions in guiding the search for antecedents is not to signal the restriction of the search space to some particular interval on a continuous accessibility scale, they can not be 'price tags'

Furthermore, it is not necessary to add lexical material to an expression, thereby increasing its size, to increase its range and the mean referential distance for the type. This can be achieved also by choosing a word whose lexical specification is inherently more restrictive, i.e. a word that is lower in the abstraction or schematization hierarchy (cf. sec. 3.2, Figure 3). Therefore two expressions of the same size and the same general grammatical description, i.e. two expressions which are non-distinct as "markers of accessibility", may have very different potentials with respect to retrieving antecedents with low accessibility

The important difference between long and short nominals is not the difference in length, but in the degree of lexical specificity - which is certainly affected by the addition of lexical material. Because a long nominal has more lexical material in it, it will be relatively more restrictive in its specification of the type of referent that may be assigned to it, most obviously if the head is the same as in the short one compared.

The lexical specifications carried by expressions are used in the process of understanding to decide whether a proper antecedent has been found so that the search may stop at the currently considered candidate which is then the discourse referent assigned to the expression in question, or whether the search must be continued. More restrictive lexical specification increases the potential of the expression for rejecting candidate antecedents offered in the search process, and therefore it has the effect of reducing competition between candidate antecedents, thereby allowing for the retrieval of less accessible antecedents.

2.3.2. The Grammar of Referential Coherence

Givon (1992b) argues strongly against the notion of topicality as a scalar property (in opposition to the views emphatically expressed in Givon 1989) of discourse and advocates the view that it is a discrete process of attentional activation guided by the - equally discrete - "grammar of referential coherence" Only one topic can be active at a time and the currently active topic serves as the 'file label' under which incoming information is to be stored. The process that decides whether current activation is to be continued and if not whether a new file should be opened or an old one reactivated, is rendered as a decision tree. At each node in the tree,

grammatical cues are used to determine the path to be chosen for further search, until finally a decision can be made.

In view of this, it may not be surprising that referential distance is deemed to be "distortive" and an "artifact of scalarity" It is, however, still used for the purpose of dividing the common topic-coding devices into the four groups in Table 2 below, and it appears to play a secondary role in defining at least some of them.

Even if gaps and differences in gaps are irrelevant to grammatical coding because of their scalarity, they are fairly consistent between different studies, and the distributions for most types of expression are not anywhere near categorial. In Givon's data zero anaphora is the only type that shows real categorial distribution, but one suspects that the reason is that they rely upon "lexical-selectional restrictions WITHIN the clause" (1992b: 15), which means that because they are bound syntactically, as well as semantically, their range is limited to the construction in which they occur (or rather· from which they are missing), just as the reflexive pronouns in Danish. Unstressed pronouns are close to having categorial distribution, but some of them do deviate from that norm. So categorial distribution with respect to referential distances cannot be what is coded by the grammar, and therefore, if grammar is indeed a discretizing device, the differences in mean referential distances or distribution profiles can not result directly or solely from grammatically coded mental processing instructions.

Table 2: Common topic-coding devices , mean Referential Distance (in number of clauses), degree of categorial distribution (Givon 1992b: 21)

	CONSTRUCTION	MEAN RD	DEGREE OF CATEGORIAL DISTRIBUTION
minimal-gap devices: CONTINUING topics	zero anaphora	1.0	100 % at mean
	unstressed pronouns	1.0	95 % at mean
small-gap devices NON-CONTINUING topics, antecedence in text	stressed pronouns	2,5	90% between 2-3
	Y-moved nominals	2,5	90% between 2-3
gap-irrelevant devices NON-CONTINUING topics, heterogeneous antecedence (mix of situational, generic, and textual sources)	full definite nominals	7.0	25% at 1.0 35% scatter 5.0 -19.0 40% at 20+
	full definite nominals with modifier(s)	10.0	55% scatter 5.0 -19.0 45% at 20+
long-gap devices NON-CONTINUING topics, distant antecedence in text	left-dislocated definite nominals	15.0	60% at 20+ (25% at 4-9) (13% at 10-19)
	repeated definite nominals	17.0	75% at 20+ (18% at 3-8) (6% at 15-19)

The primary distinction in Givon's characterization of the topic-coding devices is between continuation and discontinuation of current topic activation. Minimal-gap devices always gap minimal distances because they always continue topic activation, and topics will always have been recently mentioned. The other topic-coding devices (relevant or irrelevant to gaps) may be used also to change topics and therefore their mean referential distances will be longer, even though many of the antecedents found may have been quite recently mentioned.

The procedures Givón proposes for retrieving antecedents with the small-gap and long-gap devices, involve skipping back over the currently active referent (small-gap) or paragraph node (long-gap) and reactivation of referents that were previously active.

So, even though grammar is indeed a discretizing device, and attentional activation may be limited to one item, it appears that discourse referents in the underlying representation that are currently out of or at the periphery of attention are not equally accessible, i.e. they must somehow have different levels of activations or activation potentials. Files, or paragraph nodes that were more recently active are more easily reactivated than more distant ones, and referents that were previously fully active (at the center of attention) are more easily reactivated than more peripheral ones. If the referents in discourse representations are really so ordered, it is difficult to imagine that this ordering is functional only for some of the topic-coding devices, the gap-relevant ones.

The "small-gap devices" (stressed pronouns and Y-moved nominals) are both marked, so are Ariel's "Intermediate Accessibility Markers" demonstrative pronouns and nominals with demonstrative determiners. Pronouns and determiners are indeed discretizing devices in Givon's sense, involving a choice from a closed class of linguistic elements. So is stress, and since there is only one position in the topology of a sentence for a constituent to move to, and it has room for only one constituent, Y-movement as well. What the "small-gap" devices signal, however, is not that the antecedent is a small distance away, but rather that a non-default retrieval is intended.

For a demonstrative or otherwise marked (stressed) pronoun, finding a non-default antecedent may involve skipping over the topic, which is the default referent for pronouns, thereby somewhat increasing the referential distance that may be gapped. And the relation of demonstrative full nominals to their antecedents is non-default in the sense that they do not just identify the antecedents, but increment their representation in various ways (Maes 1992).

Givon's "long-gap devices" (primarily left-dislocation and repetition, but right-dislocation and pausing before nominals are mentioned also) appear to be reflections of conversational, rather than strictly grammatical information structuring.

They are more or less restricted to spoken language and their function appears to be the following: if a speaker anticipates problems with the identifiability of a referent to the hearer, she may tentatively introduce a referring expression in

isolation and use feedback from the hearer to see if it worked. If the reference appears to have been successful, the referent may be represented within the grammatical structure of the sentence by a pronoun (left-dislocation), if not, a full nominal, possibly further modified in order to increase its lexical specificity, may be used to represent it (repetition).

Or the speaker may hesitate before a nominal (pausing), not in order to guide the hearer, but because the cognitive load of encoding is higher for referents with low accessibility, especially if she is not sure what degree of lexical specificity the hearer needs for his end of the processing. Likewise, if the intended reference for an expression within the grammatical structure of a sentence appears to have been unsuccessful, a different formulation may be offered as repair, either immediately (repetition) or after the sentence has been syntactically completed (right-dislocation).

In that perspective, the "long-gap devices" have the advantage of making it possible for the speaker to support and repair the understanding of the hearer on the fly, without too much disruption of the grammatical structure of sentences or the smooth flow of conversation. But they work by manipulating lexical specifications, not by offering grammatically coded guidance for the search for antecedents. Dislocation or repetition of a nominal will not get a hearer to prolong the search for an antecedent by rejecting the first one found that matches the specification. Unlike the contrastive "small-gap devices" they do not defer the search from the default antecedent designated by the lexical specification of the nominal.

2.3.2.1. "Geography"

There is another criterion involved in Givón's distinction between gap-relevant and gap-irrelevant devices than the difference in mean referential distance and categorial distribution. In contradistinction to Ariel, Givón proposes that it is not only possible, but necessary for assigning reference to definite expressions that the hearer must "determine the source of definiteness among the three disjunctive options" of situation, generic knowledge, and text, on the basis of grammatical clues, and that they are accessed in that order, which is the exact opposite of the one proposed by Sperber & Wilson (1986), and, following them, by Ariel (1990). Gap-irrelevant devices are claimed to have "heterogeneous antecedence (mix of situational, generic, and textual sources)", while gap-relevant ones have "antecedence in text"

While it is fairly obvious and commonplace that these three knowledge sources are relevant to reference assignment, it is not always easy (and perhaps not necessary) to distinguish them in practice, either in everyday understanding of text and speech, or in the analysis.

The coding devices purported to be specific to the speech situation are the common deictic ones: 1st and 2nd person pronouns, demonstratives, and spatial and temporal adverbs. The problem is that, with the possible exception of 1st and 2nd person pronouns, these devices have text-deictic as well as situation-deictic

uses, and that other expressions (the "gap-irrelevant" ones at least) are also used with situation-deictic reference. So, even though there are devices that are prototypically used for reference grounded directly in the speech situation, they are not grammatical clues that direct the hearer to the situation in his search for antecedents.

Grammatical coding of the generic or cultural-lexical context is also weak. Even the possessive construction that commonly codes "frame-based reference" by syntactically combining an antecedent (conveyed by the determiner, the "possessor") with an intended referent (conveyed by the head, the "possessed") may be used for the other contexts as well. And just as it is the case with situation-based reference, other devices (the "gap-irrelevant" ones) are in common use also in culture-based reference.

Because of such problems, Givon (in a footnote) admits that his assumption "that determining the source of definiteness and searching for reference are two distinct processes - may not hold", and that searches in the discourse representation may be "a necessary sub-component of deciding the source of definiteness" (Givon 1992b: 50, fn. 39), at least if reference is not situation-based.

For some reason, he refrains from putting his suspicions in the text itself and from drawing the full conclusion: there are no grammatical clues to the sources of definiteness. If it is necessary to determine the source at all, the decision must be made on the basis of lexical specifications, and one may suspect that even this is only possible *post festum*, by finding a referent and assigning it to the expression.

2.3.3. Givenness Hierarchy

With a similar aim, but from a different perspective and with a different empirical basis, Gundel et al. have devoted a series of papers (Gundel et al. 1988, 1989, 1990, 1993) to the presentation and development of a Givenness Hierarchy (Table 3) of the six cognitive statuses of referents that are claimed to be relevant for the choice of referring expressions in discourse.

Table 3: The Givenness Hierarchy (Gundel et al. 1993: 275)

in focus >	activated >	familiar >	uniquely identifiable >	referential >	type identifiable
it	*that* *this* *this* N	*that* N	*the* N	indefinite *this* N	*a* N

Each of these statuses form the necessary and sufficient conditions for the use of particular forms of expression, as indicated in the table by prototypical examples. These forms are used by the speaker to indicate his assumptions about the addressee's knowledge of and attention to the intended referent. Each of them entails all of the lower statuses (those to the right in the table). This means, that since a referent in focus is also uniquely identifiable, a full definite nominal (*the* N) may be used to refer to it, whereas an unstressed pronoun (*it*), which requires that

the intended referent is in focus can not be used for referents of lower level cognitive status.

Gundel et al. (1993) characterize the statuses as follows:

Type identifiable:
The addressee has access to a representation of the type of the intended referent. Necessary for nominal expressions and sufficient for the indefinite determiner *a*.

Referential:
Beyond the type identification, the addressee must retrieve or construct a representation of a particular, but (as yet) unspecific referent. Necessary for all definite expressions, and necessary and sufficient for the colloquial indefinite determiner *this*.

Uniquely identifiable:
The addressee can identify the intended referent on the basis of the nominal alone. Necessary for all definite reference, and necessary and sufficient for the definite article *the*.

Familiar:
The addressee can identify the intended referent because it is already represented in his (long-term or short-term) memory Necessary for all personal pronouns and definite demonstratives, and sufficient for the demonstrative determiner *that*.

Activated:
The referent is assumed to be represented in current short-term memory The participants in the speech event are always activated. Necessary for all pronominal forms and for the demonstrative determiner *this*, and sufficient for the demonstrative pronoun *that* and for stressed personal pronouns. Determiner as well as pronominal *this* requires that the intended referent has been activated by the speaker

In focus:
The referent is at the current center of attention. Necessary for zero, cliticized and unstressed pronominals.

In the experiment that forms the empirical basis for the hierarchy, trained subjects were asked to score expressions by these statuses, and the distribution of the different forms according to the highest possible cognitive status of the intended referent was studied using a corpus of spoken and written discourses in five different languages: English, Spanish, Russian, Chinese, and Japanese (Gundel et al. 1993). English and Spanish have definite as well as indefinite articles, Chinese appears to be developing a sort of optional indefinite article, and Russian and Japanese do not encode definiteness at all. All of them have pronouns (personal as well as demonstrative), and demonstrative determiners.

The three most important findings were:

1. in English and Spanish (the languages in the sample in which definiteness is overtly expressed) indefinite nominals are not used for statuses above *referential*, although these statuses entail referentiality as well as type

identifiability; in Chinese, nominals marked for indefiniteness do not occur above *referential;*

2. definite nominals are used for all and only the statuses above their base requirement of *unique identifiability;* in the languages in the sample that do not (or not obligatorily) encode definiteness (Russian, Japanese, and Chinese) nominals without determiners cover the whole range of cognitive statuses;
3. pronouns are not used for statuses below *activated* in any of the languages.

The explanation of the downwards restrictions on the application of forms of expression appears to be straightforward in terms of the above-mentioned conventionalized conditions for using the forms, since it is required for the use of a pronoun that the intended referent should be at least activated, and for a definite nominal that its referent should be at least uniquely identifiable.

The upwards restrictions are explained in terms of the Gricean Maxim of Quantity: contributions should be as informative as required and not more informative than is required.

The conventional meaning of the indefinite article is only that the intended referent for the nominal is at least type identifiable, whereas the conversational implicature is that the referent is *not* uniquely identifiable, because one should be as informative as is required. Therefore the indefinite article is not used for the higher statuses. Likewise, referents in focus are most often coded by the strongest form: zero or unstressed pronouns even though all forms may be used because *in focus* entails all the other statuses. And similarly, the conversational implicature of using a demonstrative (which requires only that the referent is activated, and not that it is in focus) rather than an unstressed pronoun is that the referent is actually *not* in focus, i.e. demonstratives are normally used to indicate shift of focus.

Obviously, implicature based on the obligation that one should be as informative as required can not explain the distribution of definite nominals over all the cognitive statuses above the base requirement for definiteness. Rather, the explanation offered is that since full definite nominals carry sufficient information to identify the intended referent even without indication of its precise cognitive status, information concerning that status can (and usually will) be left out.

The problem with this explanation is that full *in*definite nominals carry the same information. What is restricted in the distribution over cognitive statuses is the determiners and pronouns, as is obvious from the languages that do not encode definiteness, not that part of nominals (the head noun and its modifiers) that carries the type information that is called upon in this argument. Type specification does not appear to be of any use in indicating the cognitive status of referents.

Type specifications may (and do) have procedural effects anyway, because of their role in matching definite expressions against antecedent referents: not only may specifications mention antecedents explicitly (as in possessive determiners and often in prepositional phrases and relative clauses), but the degree of schematicity

of the specification is related to the potential for resisting a match: schematic specifications are less resistant than more concrete ones, pronouns, e.g., are less resistant than full definite nominals, and personal pronouns (that take only human or animate referents are more resistant than pronouns reserved for non-animate referents.

This is of particular importance for bridging references, because they are not marked specifically· on the face of them, the expressions used in bridging are exactly like other definite expressions, with no indication that they should be processed in some special way According to Gundel et al. (and Ariel) bridging is not a cognitive status of its own, even though the antecedent which anchors the bridge will of course have a status. But as it was demonstrated in the previous section, antecedents of definite expressions that require bridging are much more recent (almost on the same order as for pronouns), i.e. they are more focused, than is the case with identical referents.

The reason must be that the antecedent basis for the match is highly schematic, and hence of a low degree of activation, because it forms part of the default specifications for aspects of objects and participants of events that constrain instantiations of these aspects and participants whereas with identity this basis is already instantiated. For pronouns and other expressions whose lexical specifications are highly schematic, the picture is reversed. here the schematicity is on the side of the expression, not the antecedent. Therefore its activating force is low and it takes only highly activated antecedents. And therefore bridging references are uncommon with pronouns: they appear to require fairly concrete specifications.

Furthermore, there are languages, such as Danish (and, I believe, the other Scandinavian languages as well), in which the difference between definite and (distal) demonstrative is not lexicalized (as in English), but prosodic: stress makes the difference.

As described in sec. 2.1, Danish has two definite determiners: one is a suffix on the head noun (*-en, -et, -ne*, depending on gender and number), historically derived from the now extinct medial demonstrative, and used only when there are no modifiers preceding the head noun. The other (*den, det, de*, depending on gender and number) is preposed (like determiners in English, German and French), used in its unstressed form to indicate definiteness when there are modifiers before the head noun. When stressed, irrespective of premodifiers, it is the distal demonstrative determiner And, when it occurs alone, depending on stress, it is the definite pronoun or distal demonstrative used for non-animate referents. Likewise, as in English, the personal pronouns may be used as a kind of personal demonstratives if they are stressed, and, unlike English, 3rd person personal pronouns (*ham , hende* ('him, her'), can be used colloquially as determiners of proper names (in the oblique form, as is usual in colloquial Danish when personal pronouns are components of a complex nominal).

Furthermore, it appears that either the boundaries between the statuses above *uniquely identifiable* are less than clear-cut, or the intuitions of language users, even

when they have been trained to make the distinctions, do not properly match the definitions of the statuses: Not only did the two trained coders that assessed the statuses in the analysis partly on the basis of objective criteria, agree on only about 90% of the cases, but "most disagreements were between familiar vs. activated or activated vs. in focus" (Gundel et al 1993: 291, fn. 21).

Therefore I propose to view the Givenness Hierarchy as having the three unmarked levels of *in focus*, *uniquely identifiable*, and *type identifiable*, expressed by unstressed and non-demonstrative pronouns and determiners each with a marked companion corresponding to *activated*, *familiar*, and *referential*, and expressed by a stressed pronoun or determiner or by a lexicalized demonstrative.

Definite expressions, whether pronouns or full nominals, would then conventionally indicate at least *unique identifiability* and indefinite expressions would conventionally indicate *type identifiability*, but exclude unique identifiability As usual, the unmarked members of the paradigm extend also to the uses of the marked members in the non-contrastive cases. Intuitively, and from the evidence cited by Gundel et al. this boundary appears to be a sharp one in the languages that encode it: the only possible counter-example is one single instance of an "indefinite this N" with referential status in the English sample. No other grammaticalized item ever crosses the border between definite and indefinite, or unique and type identifiability

The referents of unmarked pronouns are usually *in focus* , though not necessarily conventionally or by implicature. Rather, their high degree of schematicity makes them promiscuous: they will match almost any specification offered as antecedent, and will therefore find antecedents among the candidates that are suggested very early in the search, i.e. the most highly focused ones. And, to judge from the coders' difficulties, the statuses above *uniquely identifiable* are not clearly different; *uniquely identifiable* and *in focus* appear to be the end-points of a scale.

Table 4: 3 Levels of Givenness + Markedness

	in focus	**uniquely identifiable**	**type identifiable**
unmarked	den han	den <mod> N N-en (ham) Prop	en N
marked: stressed	DEN, HAN	DEN N DEN /HAM Prop	QUANT (<mod>) N QUANT (<mod>) EN QUANT (<mod>) Ø
demonstrative (+ her/der)	*spoken* ham der den der *written* denne *spoken* ham den(ne) her	*spoken*. den der N ham der Prop *written* denne N *spoken* den (ne) her N	
	(activated)	(familiar)	(referential)

In short summary: Grammatical cues are not used to mark or signal the accessibility of antecedents on a more or less continuous scale. Their role is procedural, however Definite nominals mark referents as uniquely identifiable to the hearer (or familiar, in the sense of Hansen (1927), which is, I believe, the original source of that term), while indefinite nominals mark them as not uniquely identifiable. Type identifiability does not need specific grammatical marking, because it depends on the lexical specifications that are always present with full nominals. Demonstratives and other marked expressions indicate non-default retrieval, either in terms of the identification of the referent, or the information added to its specification.

3. The Role of Lexical Specifications

A fairly detailed, empirically based taxonomy of anaphoric relations, especially bridging relations, has been one of the aims of the current study, because it provides a window to the types of knowledge that language users draw upon in discourse comprehension.

In the first section of this chapter, I review some taxonomies of anaphoric relationships as a background for suggesting my own which is based on the empirical study reported and presented in the second half of section 3.1. Section 3.2 presents the frequencies of the different types of relations found with different types of definite expressions and the distributions of expressions with different relations over referential distance. Finally, section 3.3 discusses the way different theories account for bridging references.

3.1. Types of Anaphoric Relationships

Taxonomies of anaphoric relations are made mainly in text linguistics, and those used in AI procedures for the resolution of anaphora are usually based on text linguistics. Thus, i.e., Carter (1987) bases his procedure mainly on Halliday & Hasan (1976). Text linguistics is concerned with textual cohesion, not specifically with referential continuity or the mental representation or processing of discourse. But the "cohesive ties" or relationships that make texts hang together form part of the basis on which such processes operate to create and develop the mental representations.

Here I shall take a closer look at the taxonomies of cohesive relationships proposed by Halliday & Hasan (1976), by Källgren (1979) which incorporates Enkvist's (1974), and by Togeby (1979, 1993) which is based on Enkvist (1974 and Lyons (1968, 1977). Togeby (1993) also proposes a set of rules for building mental models of discourse. Clark (1977) and Clark & Haviland (1977) address the problem of referential continuity specifically in terms of cognitive processing. The taxonomies are summarized in Table 1 below which formed a heuristic basis for the categorization used in the empirical study

Halliday & Hasan

Halliday & Hasan (1976) see texts as semantic units, not units of form. Texts are realized by sentences but they do not consist of them. Therefore, the parts of a text are not integrated structurally the way the parts of a sentence are. Rather, "Cohesion occurs where the INTERPRETATION of some element in the discourse is dependent on that of another. The one PRESUPPOSES the other, in the sense that it cannot be decoded except by recourse to it" (p 4). Cohesion - or texture - cannot be described in terms of constituent structures above the level of the sentence.

Two major kinds of cohesion are distinguished: grammatical and lexical. Grammatical cohesion is achieved by grammatical means, i.e. closed class (or zero) elements and comprises *reference* (identity of the things being talked about), *substitution* (where antecedents are linguistic expressions, not referents), and *ellipsis* (substitution by zero). *Lexical cohesion* is achieved by the use of repeated or semantically related words.

By **reference** anaphors derive their reference from antecedents. Three types are distinguished (p. 37):

> **Personal** reference by means of deixis, or function in the speech situation, realized through the category of person in personal and possessive pronouns. Normally the antecedent is explicit and there is agreement in gender, sex, person and number In some cases, though, anaphors may be "strained", with implicit antecedents and loose agreement.
>
> **Demonstrative** reference by means of location, i.e. proximity in terms of space, time or association with the speaker and hearer in the speech situation or in the text.
>
> **Comparative** reference by means of identity or similarity Comparative reference is indirect, i.e. anaphor and antecedent are not (necessarily, at least) coreferential. General comparison is realized by words such as: *samme, sadan, anden* (same, such, other) and particular comparison by comparatives and quantifiers.

By **substitution and ellipsis** "descriptional" anaphors derive their sense or "description" (what I have called *specification*, following Langacker 1987), but not their reference from antecedents. Substitution (including ellipsis which is simply substitution by zero), is seen as a relation between linguistic items, rather than their meanings or referents. Substitution and ellipsis occur at the *nominal*, *verbal* and *clausal* levels.

In Danish, nominal substitution is used far less than in English, while pronouns and nominal ellipses are used far more commonly with the same function, especially in definite nominals. Also, articles and adjectives are marked for number and gender (like pronouns), which might indicate that the resolution processes for reference and substitution/ellipsis could be more alike after all. As for verbal and clausal substitution, Danish uses personal and demonstrative pronouns to substitute for the arguments and modifiers of verbs as well for clauses. Again, if this is not reference proper, it is certainly very much like it. Verbs are substituted by *gøre* (do), and by the modals and auxiliaries.

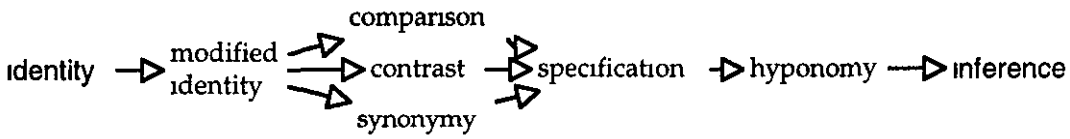
Lexical cohesion is achieved by repeating words or by using semantically related words. It is important to note that lexical cohesion is not necessarily anaphoric in the proper sense. Definite nominals are referential anaphors by their definiteness (which belongs with the pronouns in the *reference* category), not by their lexical-semantic relation to other words in the text. Therefore indefinite nominals may be cohesive without contributing directly to the referential continuity of the text. Two main types of lexical cohesion are distinguished:

Reiteration is the use of repetition, synonyms or near synonyms, superordinates or 'general' words to reintroduce a lexical item. I.e., the words used are of the same or a higher degree of abstraction. The borderline to reference which involves pronouns is by no means clear-cut. Pronouns are simply the next higher level of abstraction. When reiteration is used the intended referent is identical to the antecedent - just as it is the case for pronouns.

Collocation is all lexical cohesion that is not covered by reiteration. Collocation "results from the co-occurrence of lexical items that are in some way or another typically associated with one another, because they tend to occur in similar environments" (Halliday & Hasan 1976: 287). The meaning relations involved are "not easy to classify in systematic semantic terms" - and the attempt is not made. Some prototypical examples of the meaning (or sense) relations are part-whole and object-property; but other, less easily definable relations are by no means rare.

Källgren

Like Halliday & Hasan, Källgren (1979) sees the cohesive relationships in texts primarily as semantic content relations. They are what changes sequences of sentences into coherent text. Her taxonomy of referential bindings is based on Enkvist (1974). She attempts to "provide criteria for each relation, and to the degree the criteria for a relation are included in the criteria for another, the former relation is regarded as being weaker than the latter"[1] which enables her to introduce the following hierarchical ordering of the types (p 81) which, I imagine, should reflect the default order in which the relationships are attempted in resolution, if there are no clues to overrule it:



A short summary of the criteria are

Identity: the anaphor and antecedent have semantic and formal identity, with the sole exception of the alternation between definite and indefinite form in nouns; they have identical reference;

Modified identity: alternation between parts of speech is accepted, as well as addition, subtraction and change of determiners and modifiers, provided the head is unchanged, the anaphor and antecedent have identical reference;

---

[1] "ange kriterier för varje relation, och i den mån kriterierna för en relation inkluderas i kriterierna för en annan anses den förre relationen vara underordnad den senare" (p. 81).

Synonymy: here different expressions for the same phenomenon are used - metaphor is included, the anaphor and antecedent have identical reference;

Contrast: the anaphor and antecedent have different referents, but usually with many features in common, often they are co-hyponymous or co-specifying as well,

Comparison: cohesion is achieved by the use of comparatives; comparison is like hyponymy, specification, or even contrast;

Specification/generalization/co-specification. the anaphor and antecedent *stand in some sort of part-whole relationship to one another* - inalienable possession and set-subset relationships (often expressed by ellipsis/expansion) are included,

Hyponymy/hypernymy/co-hyponymy: the anaphor and antecedent are rated by the sub- and superordination of the concepts involved,

Pronoun/antecedent: the relationship between the anaphor and antecedent is like identity and modified identity, but expressed with pronouns or adverbs;

Ellipsis/expansion. something is removed from or added to the expression,

Inference the anaphor and antecedent are associated with each other in some sense.

Even though inference is the "trash can" category, Källgren claims that it is "the basis for all the types of referential binding presented above. All types of binding are based on knowledge about how phenomena are related to each other. When this knowledge is implicit we have inferential binding, when it is stated explicitly, inference is overridden by stronger types of binding."[2]

Togeby

Togeby (1979 departs from the claim that cohesion can be described by the "(usually paradigmatically defined) semantic relations that occur as syntagmatic relations in the sequence"[3] He enumerates a number of relations, some of them with formal definitions based on Lyons (1968, 1977):

Synonymy: Synonyms can be substituted for one another in a sentence without a change of referential meaning.

---

[2] "ligger till grund för alla de ovan presenterade referensbindningstyperna. Alla bindningstyper bygger på kunskap om hur företeelser är relaterade till varandra. När denna kunskap underförstås föreligger inferensbindning, när den uttrycks explicit överflyglas inferensen av starkare bindningstyper." (p. 77-8).

[3] "(som regel paradigmatisk definerede) semantiske relationer der optræder som syntagmatiske relationer i forløbet." (p. 43).

Hyponymy· The relation between a specific and a more general term so that a sentence with the specific term implies the one in which the general term is substituted.

Co-hyponymy· The relation between two terms that are both hyponyms of the same term.

Antonymy· Two terms are antonyms if substitution results in incompatible sentences. Antonymy always implies a comparison.

Complementarity· Two terms are complementary if a sentence with one of them implies a negation of the one in which the other is substituted.

A number of other relations are just mentioned and exemplified. It is characteristic of them that they allow reference from one term to the other with a definite nominal:

part-whole, object-material, set-element, space-contents, cause-effect, means-ends, relator-relatum, object-function.

Togeby (1993) recapitulates all of these together with a few more (apparently based on Clark 1977) under the heading of *enablement*, the common characteristic is now viewed as one of enablement: a mention of the first term enables mention of the second by a definite nominal. The added relations are

action-roles, action-intention, event-cause, event-consequences, category-evaluation, category name-epithet, sign-designated.

Carter

Carter (1987), which is based on Halliday & Hasan (1976) and Sidner (1979), distinguishes between six different relationships between the references of an anaphor and its antecedent. I use the term *reference*, rather than Carter's and Sidner's *specification*, since what they intend is what is usually called reference, and I use *specification* in a different sense.

Only in Reference (1) and (2) do the anaphor and antecedent have identical reference, and pronouns participate only in Reference (1).

Reference (1): A definite nominal corefers with an element if the nominal has the same head as the element and introduces no new information; a pronoun corefers with the element if they match by selectional and configurational criteria,

Reference (2): A definite nominal corefers with an element if the head noun of the nominal lexically generalizes the head noun of the element and has no restrictive post-modifiers;

Associated Reference: If the definite nominal names an element associated with the focus by analytic inference, it refers to that element;

Inferred Reference: Like Associated Specification, but with non-analytic inference (Sidner) or a relaxed information constraint (Carter);

> **Set-Element Reference:** If the candidate antecedent is a set and the definite nominal is singular, has the same head as the antecedent, but with modifiers added, it refers to an element of the focus;
>
> **Computed Reference:** If the definite nominal has an ordinal modifier, same head as the candidate antecedent, and no relative clause modifiers, its reference can be computed from that of the antecedent.

Carter does not discuss substitution and ellipsis in any detail. The main reason is that there are many ways in which an expression may be elliptical, and his parser does not accept them as grammatical.

Clark

The taxonomy proposed in Clark's seminal paper on Bridging (1977) is the one that most directly forms the basis for the one used here:

> **Direct reference** is reference to an already mentioned entity Identity between the antecedent and the intended referent can be achieved by repeating an expression, or by using a synonym, a pronoun, or an epithet. A member or subset of a set may be picked out uniquely by various types of expressions that quantify or specify within the antecedent set.
>
> **Indirect reference by association** is reference to parts and properties of antecedents that have varying degrees of predictability, ranging from necessary to inducible.
>
> **Indirect reference by characterization** is reference to necessary and optional roles in previously mentioned events using relational words.
>
> **Reasons, causes, consequences, and concurrences** of previously mentioned events.

Like Källgren, Clark emphasizes that even the establishment of an identical reference requires a bridging inference, however trivial it may be, and that bridging inferences draw on knowledge of objects and events beyond the knowledge of language.

Table 1. Overview of taxonomies for anaphoric referential relations

Clark 1977	Källgren 1979 Enkvist 1974	Halliday & Hasan 1976	Togeby 1979, 1993	Carter 1987
identity	identity	same item		reference (1): same head
	synonymy· modified identity	synonym or near synonym	synonymy	
pronominal-ization	pronominal & adverbial reference	personal & demonstrative reference		reference (1): pronoun
	hypernymy	superordinate	hyponymy	reference (2): generalization
	generalization	general' item		
				generic (?)
epithets			category name-epithet	reference (2): epithets
			category-evaluation	
set-member			set-element	set-element
	hyponymy	hyponymy	hyponymy	
parts (necessary, probable, & inducible)	specification	part-whole	part-whole	
	co-hyponymy	co-hyponymy	co-hyponymy	
	co-specification	part-part		
	comparation	comparative reference		
	contrast			
		complementarity	antonymy	
roles (necessary & optional)	inference		cause-effect; ends-means; thing-material; container-contained, relator-relatum; object-function; action-roles; action-intention; event-cause; event-consequences; sign-designated	association & inference
reasons, causes, consequences, concurrences		ordered series		computation

3.1.1. No Textual Antecedent

3.1.1.1. Exophor

A definite nominal with exophoric reference is one that is used for a referent which has not been mentioned previously, but which the speaker nonetheless takes to be uniquely identifiable to the hearer. The knowledge sources available to the hearer for the identification of the referent are general knowledge (pertaining to groups of varying extent, such as humanity, a nation, a community or a family) and knowledge about the speech situation.

General knowledge

Herren	('the Lord')
skomageren	('the shoemaker')
selve politidirektøren	('the police commissioner himself')
solen	('the sun')
Anna Bak	
Lavnæs	

Knowledge about the speech situation

din	('your')
vi	('we')
disse dage	('these days')

- meaning "these few days, close to now", not "nowadays"

As noted in the previous chapter there are no safe grammatical cues that will lead the hearer to prefer an exophoric rather than an endophoric (or text based) reading of a definite nominal. Certain grammatical categories (1. and 2. person personal pronouns) are prototypically - possibly even exclusively - used deictically (with exophoric reference within the speech situation), and derive their core meaning from this use. Other categories (such as demonstratives, and adverbs like *her* ('here'), *der* ('there'), *nu* ('now')), also derive their core meaning from their use in the speech situation, but they are used more widely as well. And other types of definite nominals that do not derive their core meanings directly from being used in reference to aspects of the speech situation, may be used with exophoric reference.

3.1.1.2. Generic reference

What is presupposed with generic reference is the specification or generic concept of a class, rather than any concrete instance of it that has been mentioned or is otherwise salient in the situation. Therefore nominals with generic reference are counted as having no textual antecedent. In some cases this decision may be debatable, because instances of the class have been mentioned or implied, which means that their specification will be around somewhere as well. Also, Webber (1983) mentions examples like "My neighbor has a Rhodesian Ridgeback. **They** are really vicious beasts" in which a pronoun is used with generic reference and

definitely with an explicit antecedent. In the present study no pronouns with generic reference were encountered.

> *En anden kvinde, der havde et mere akademisk syn på sagen, kunne fortælle, at* ***kvindeklovnen*** *nok måtte mere hen i retning af det selvudleverende, hvor svært det end matte være*
> ('Another woman who had a more academic view of the matter, could tell [us] that **the female clown** would probably have to move more in the direction of self-disclosure, however difficult that might be.')

3.1.1.3. Idioms

In idiomatic expressions it is not easy to determine the source of definiteness. I take it for granted that idioms are motivated, but not in ways that are of immediate concern here. Idioms are separated out as anomalies, not to be subjected to further analysis.

hakke i det	('chop in it' - "stutter")
være pa sporet	('be on the track/scent' - "understand")

3.1.2. Direct reference

3.1.2.1. Identical Reference

With identical reference there is identity between the antecedent and the currently intended referent. Identical reference is the overwhelming norm for pronouns and proper names that have explicit antecedents, whereas less than half of the full nominals exhibit identical reference.

In some cases (with pronouns as well as full nominals) the term "identical reference" is rather strained because identity appears to be retained over radical changes in the real world referents in question (cooking recipes give the paradigm examples for this, in the literature, as well as in the corpus studied here):

> *Skræl* ***æblerne****, skær* ***dem*** *i bade, fjern kernehus og rør* ***æblerne*** *i gryden. Lad* ***dem*** *svitse med til* ***de*** *er bløde.*
> ('Peel **the apples**, cut *them* into boat[-shaped piece]s, remove core, and stir **the apples** in the pot. Let **them** fry [lightly] until **they** are soft.')

Identical, text based reference for a definite nominal can be achieved in a variety of ways, at least with full nominals: by repeating the word used to introduce the referent, by using a synonym of the introducing expression or a word which is more abstract than the one used in first mention. More colorful terms are used also: identity of reference may be achieved by epithets, metaphors, and metonymies as well. Pronouns are of course highly abstract terms with respect to the specifications of the antecedents they are used to retrieve. Proper names depend almost solely on repetition.

Repetition

The head of the definite nominal is a repetition of the head of a previous expression. Nominalizations of explicit verbs are included as well as changes in (attributive) modifications of the nominal. This means that although the referent is the same, new information about it may be added by introducing new modifiers. It also means that even with repetition, reference may actually be accomplished by a more abstract nominal than the introducing one because it may have been stripped of modifiers without changing the head. Repetition means repetition of the head, not the whole nominal.

briterne <- briterne, ('the British <- the British')
de tilstedeværende <- de tilstedeværende,
('the present [persons] <- the present [persons]')
Christine <- Christine

Synonymy

The head of the definite nominal is a word with a specification that is identical or overlapping to a very high degree with a previously introduced specification. The borderline to other relations is quite fuzzy, especially to abstraction and metonymy

DET tyske tilsagn <- den tyske invitation
('The German promise <- the German invitation')

briterne <- Storbritanien
('the British <- Great Britain')

Abstraction and Pronominalization

A head noun with a more abstract or schematic specification than in the introducing expression may be used in reference to a previously mentioned antecedent with a more concrete specification.

DET tyske tilsagn <- Tyskernes udspil
('The German promise <- the initiative of the Germans')

Obtaining identical reference with pronouns is in many ways like using abstractions with full nominals. Pronouns form the top end of the abstraction or schematization hierarchy of lexical specification, and because of their schematicity they appear to involve a "quantum jump" in the referential distances covered as well: pronouns are restricted to antecedents that are at or close to the current center of attention, full nominals are not.

beboerne i de pæne villaer nedenfor <- de
('the inhabitants of the nice mansions below <- they')

Demonstratives (including 3rd person definite pronouns) may have many different kinds of antecedents, including facts, verbal complements, and propositions:

Man kan også midt om sommeren tage skud af malurt og lade dem trække 12-15 timer og begynde prøvesmagningen.
***Det** kræver omhu og opmærksomhed.*
('One can also in the middle of the summer take shots of wormwood and let them draw for 12-15 hours and start test tasting.
That demands care and attention.')

Trope: Epithet and Metaphor

Epithets are abstract words that carry extra information about the attitude of the speaker towards the intended referent, but this does not affect the reference for the expression.

Edward Saksehand <- det saksende og sky punkmonster
('Edward Scissorhands <- the scissoring and shy punkmonster')

Metaphors are not necessarily abstract words, but with respect to reference, the match does not concern all items in the specifications.

denne retning <- familien ('this trend <- the family')

3.1.2.2. Set/Element Reference

In set/element reference the antecedent is a previously introduced set of referents, and the definite nominal is used to pick out a subset or element of the presupposed set, either by quantifying into it, or by adding to the specification originally used to introduce it, so that only some (or one) of its elements conform to the new, narrower specification. The original specification is quite often presupposed as well as the referent itself so that only the contrastive element is explicit in the definite nominal: In English *one*-substitution is very common in this function, and in Danish ellipsis is often used if one of the contrastive elements is expressed in a premodifier, while pronouns are used if there are only postmodifiers. Nominals with distal determiners (those that allow premodifiers) are also common in this function.

specification:

kærlighedens handler, den redelige, kaldet prostitution, og den fordækte, kaldet ægteskab
('the bargains of love, the honest [one], called prostitution, and the covert [one], called marriage')

quantification

35 g afsmeltet fjerkræfedt/smør
<- halvdelen af fedstoffet <- resten af fedtstoffet
('35 g rendered poultry fat/butter
<- [the] half of the fat <- the rest of the fat')

3.1.3. Object Based Reference

3.1.3.1. Parts

A definite nominal may be used with reference to a constituent part of some previously introduced object, i.e. the parts of an object can be presupposed as well as the object itself. In referential chains, as the example below, referential distance is not counted all the way back to the latest mention of the whole, but only to the latest mention of a member of the entire complex, irrespective of whether the relationship is whole <- part or part <- part. Reference for a definite nominal cannot be based on part <- whole relationships.

damen <- sin hand <- hænderne <- ansigtet <- blikket <-hagen <- øjnene <- næsen <- munden <- den mægtige tykke underlæbe
('the lady <- her hand <- the hands <- the face <- the gaze <- the chin <- the eyes <- the nose <- the mouth <- the enormous thick lower lip')

3.1.3.2. Properties

Likewise, if an object has been introduced, a definite nominal may be used with reference to properties of that object. As with parts, distances in referential chains are counted back to the latest mention of member of a complex: object <- property as well as property <- property relationships occur, but not property <- object.

Malurtsnapsen vinder ved lagring, gerne i et par år eller mere. ***Smagen*** *bliver fyldigere, mere afrundet.* ***Farven*** *er svagt grønlig, næsten klar, senere får den en svag gullig tone.*
('The wormwood dram gains from storage, preferably for a couple of years or more. **The taste** gets more body, more roundness. **The colour** is faintly greenish, almost clear, later it gets a faint yellowish tone.')

Stedbestemmelse ved ikke-samtidige stedlinier <-
Denne stedbestemmelses palidelighed *afhænger ikke alene af pejlingernes nøjagtighed, men ogsa af hvor nøjagtigt man har bestemt den beholdne kurs og distance mellem pejlingerne;* ***det største usikkerhedsmoment*** *er strømmen, som man i reglen kun kan skønne sig til.*
('Fixing of position by non-simultaneous bearings <-
The reliability of this fix depends not only upon the accuracy of the bearings, but also upon how accurately the course and distance over the ground between the bearings has been determined, **the greatest element of uncertainty** is the current which can usually only be estimated.')

3.1.3.3. Material

Once an object has been introduced, the material, or ingredients, of which it consists can be referred to by a definite nominal.

klædt i sort <- det sorte klæde
('dressed in black <- the black cloth')

buddingen <- hviderne, dejgen
('the pudding <- the whites [of eggs], the dough')

skålenes metal
('the metal of the cups')

3.1.3.4. Function

Likewise, the function of an object may be referenced by a definite nominal if the object is already salient:

skibets sejlads
('the ship's sailing')

3.1.4. Event Based Reference

Reference which is based on knowledge of the structure of events, does not lend itself to hard and fast categorization. Current research in lexical semantics (Pustejovsky 1991, 1992, Jackendoff 1990, 1992, Talmy 1985) indicates that there is a multitude of highly specific relations between events and participants of events, and that the coarse-grained distinctions which are possible with case grammar (Fillmore 1968, Ruus 1979) are not sufficient to account for them. With regard to building a taxonomy it is a problem that event-based reference exhibits a confusing amount of relationships that occur rarely

The most frequent types of event based reference have been identified and labeled, but many others remain in the trash can of "inferentially related" It appears that further categorization of such relationships will have to await the analysis of many more types of events than are available currently

It may be noteworthy in this respect that while the subevents and participants in causative events, as described by Talmy (1976, 1985) are frequently expressed by definite nominals and presuppose one another as antecedents in a variety of different relations, this is not the case for the participants in the motion event, similarly analyzed by Talmy (1975, 1985), apparently not even with relational words. It is not easy to see why the two types of events should differ with respect to their capacity for furnishing a basis for bridging references, but they do.

3.1.4.1. Kinship and Other Lexically Specified Relations

The lexical specifications of many nouns require that possible referents stand in a particular relation to some other thing, or, rather, they specify a particular role in an event. Such relations are very often expressed by nominals with possessive determiners in which the two terms are both explicitly mentioned, with the presupposed reference point or anchor as possessor, and the currently intended referent as possessed. But plain definite nominals with relational nouns as head and no mention of any reference point also occur Kinship relations are prototypical for this category·

Annas far ('Anna's father')
præstens datter ('The vicar's daughter')

jeres mors tante ('your mother's aunt')
forældregenerationerne ('the parent generations')

But there is also an abundance of other relations that behave linguistically very much like kinship relations, even though they do not always form the same kind of large, interconnected category systems:

hendes veninder ('her [female] friends')
hans præstelige modstandere ('his clerical opponents')
hans (nu afdøde) amerikanske inspirationskilde
('his (now departed) American source of inspiration')
hans maitresse ('his maitresse')
trioens leder ('the leader of the trio')
sin svenske kollega ('his Swedish colleague')
[a question expressed by the preceding sentence] <- *svaret* ('the answer')

Relationally specified nominals may also be constructed by modification, rather than by using an inherently relational head noun:

ethvert sted i kortet <- det tilsvarende sted pa jorden
('any position in the map <- the corresponding position on Earth)
Pilot Charts <- det pågældende farvandsomrade
('Pilot Charts <- the water in question') - covered by the chart, i.e.
Det historiske opbrud, som de kommunistiske diktaturers fald 1989-90 har udløst
('The historical departure, that was triggered by the fall of the communist dictatorships in 1989-90')

This category is of course somewhat arbitrary because nouns that clearly belong to some other, particular relation that is independently motivated are put there together with words that one would not like to categorize as relational by lexical specification, but which bear this particular relation to an antecedent in a particular context. Body parts, e.g., are taken to be in an object based relation either to the body or to other, "superordinate" parts of the body, although it can certainly be argued that they are relational because the relation in question forms part of the lexical specification of the nouns used in reference to body parts. Likewise, relations that are expressed by words such as *årsagen* ('the cause') or *formålet* ('the purpose') are put under causation.

3.1.4.2. Ownership

Things that are owned by (or belong to) a known antecedent may be referred to by a definite nominal without previous mention, not always in a possessive construction.

den døende skomagers alkove ('the dying shoemaker's box bed')
mit blommetræ ('my plum tree')
cyklisterne <- cyklen ('the cyclists <- the bicycle')

The last example may appear to be debatable: why is the relation between the cyclist and his bicycle not, say, an agent-instrument relation? Admittedly, the decision is arbitrary to some degree. One reason for it is that the bike is related to

the cyclist in more or less the same way as the pieces of clothing she is wearing, and pieces of clothing are commonly seen as possessed items in the narrow sense, and are often expressed by definite nominals without possessive determiners.

3.1.4.3. Causative Relations

In Talmy's (1976, 1985) analysis of the basic causative event, it consists of a causing and a resulting event, and the causal relation between them. The moving element, the figure, of the causing event may surface as the instrument of the sentence that expresses the causative event. More complex causative events also involve different types of agents. All of these may be referenced by using a definite nominal, even without having been mentioned previously, if the causal event has been described or mentioned.

Sometimes words with relational specifications are used.

den besynderlige virkning ('the peculiar effect')
strømmens virkning ('the effect of the current')
dets formål ('its purpose')
resultatet ('the result')
hovedarsagen ('the main cause')
deres udspring ('their source')

But this certainly not always the case. *Results* may be referenced by definite nominals with processes or procedures (causing events, i.e.) described in the preceding text as antecedents. This is quite common in cooking recipes and other instruction texts:

[procedure] <- *dejgen* ('the dough')
[procedure] <- *buddingen* ('the pudding')
[procedure] <- *jævningen* ('the thickening')
[procedure] <- *grøden* ('the mush')

Or the agents of such processes may be antecedents for the *results* they bring about. Most commonly, but not exclusively, this is expressed in a possessive construction:

Poul Martinsens udsendelse ('Poul Martinsen's programme')
DR TV's serie ('DR TV's series')
Darwin's Om Arternes Oprindelse ('Darwin's On the Origin of Species')
Karl Marx' natursyn ('Karl Marx' view of nature')
den kvantitative naturvidenskabs vrøvl
('the nonsense of quantitative natural science')
trioen <- sammenspillet ('the trio <- the ensemble playing')

The relationship may also be the other way round: Results may function as antecedents for *agents*, but only (at least in my corpus) if the definite nominal expressing the agent is relational:

den amerikanske uafhængighedserklærings hovedforfatter
('the main author of the American Declaration of Independence')

[a book entitled] *30 sorter kryddat bränntvin <- forfatteren*
('30 sorts of seasoned brandy <- the author/writer')
koncert <- musikerne ('concert <- the musicians')

Instruments may be expressed by a definite nominal without previous mention, as with results, the antecedent is often the causing event: a process or procedure described or mentioned in the text (especially, but not exclusively in recipes)

[procedure]	<- *vandet* ('the water')	
[procedure]	<- *gryden* ('the pot')	
[procedure]	<- *ilden* ('the fire')	
skrive	<- *maskinen*	<- *papiret*
('write	<- the machine (typewriter)	<- the paper')

3.1.4.4. Other Inferential Relations

A host of other, highly specific and very elusive relations still remain under the heading of "inferential" Very often they are rendered by relational words, or by possessive constructions. Nominals with referential modifiers have been given a special category here, because referential modifiers is a way to make a nominal relational by specifying in detail the relations and entities that are necessary for the unique identification of the intended referent, and because referential distance is not a real issue.

The semantic relationships that were identified in the corpus as a basis for definite reference are summarized in Table 2:

Table 2: Summary of anaphoric relations

No Antecedent in Text	Direct Reference	Object-based Reference	Event-based Reference
exophor generic idiom	identical: repetition, synonymy, abstract & pronoun, trope set-element: specification, quantification	parts properties material function	causative: agent, cause, result, instrument ownership relational: kinship, inferential, referential

3.2. Empirical Results

3.2.1. Overview of Antecedent Relations

From Table 1, it is obvious that proper names and pronouns contribute very little to object and event based reference. No proper names with object based reference were found, and of the two with event based reference, neither appears to be a good, prototypical instance. The pronouns with object or event based reference either have referential modifiers or specialized lexical specifications. So do many of the full nominals with object and event based reference, but by no means all of them.

Table 1. Frequency of Definite Nominals by Antecedent Relation and Type of Expression

N = %	Total	NoAnte	Direct	Object	Event
proper	455 = 12	274 = 29	179 = 10	0 = 0	2 = 0
pronoun	1057 = 29	275 = 29	760 = 44	2 = 0	20 = 4
full nominal	2140 = 59	407 = 43	789 = 46	415 = 100	529 = 96
total	3652 = 100	956 = 100	1728 = 100	417 = 100	551 = 100

Proper Names

One of the two proper names with event based reference is *premierminister Major* ('Prime Minister Major') with a chain of synonyms for the British government as antecedent: *Storbritanien, briterne, London* ('Great Britain, the British, London'). Since the views of Prime Minister Major are explicitly contrasted with those of his predecessor, this has not been counted as just another synonym, which would have been the obvious alternative.

The other is *mor* ('mother') with *de fine damer* ('the fashionable ladies') as antecedent. It occurs in an ironic comment on the tradition (or myth?) of upper class young ladies meeting with their mothers for tea when shopping in central Copenhagen. The bare form of the noun indicates that it is being used as a proper name, while the lower case initial letter might seem to point in a different direction.

In practice, proper names are restricted to exophoric and identical reference, and even these two are not always easily kept apart, because renewed, independent reference with an expression that can always be used with uniquely identifiable reference cannot be separated from repeated, dependent reference with the same expression, and proper names do not usually form the referential chains one finds with other expressions.

Little more will need to be said about proper names in this section because their reference does not depend on lexical specifications generally available to language users. Rather, they appear to have uniquely identifiable referents because they specify a set with just one member as far as the particular discourse participants are concerned. When this condition does not obtain, modifiers (such as descriptors or first and last names if they happen to have been initially omitted) may be introduced to achieve unique identifiability But this is not a signal to the hearer that the intended referent should be looked for among the not so highly accessible ones. It is simply a means of providing him with the material necessary for the identification of the referent, i.e. with a criterion for stopping the search and for breaking ties if several candidates are equally possible when the search is stopped.

Pronouns

Table 2 shows the frequency of the various types of definite pronouns by different antecedent relations. It was noted above that pronouns with indirect or, more generally, non-identical reference either have referential modifiers, or specialized lexical specifications. The former is the case for the 15 distal pronouns and the 3 proximal pronouns, all with event based reference.

Table 2: Frequency of Definite Pronouns by Antecedent Relation and Type of Expression

N = %	Total	NoAnte	Direct	Object	Event
personal	381 = 36	217 = 75	164 = 22	0 = 0	0 = 0
possessive	94 = 9	37 = 13	57 = 8	0 = 0	0 = 0
distal	475 = 44	24 = 8	436 = 57	0 = 0	15 = 75
proximal	15 = 1	0 = 0	12 = 2	0 = 0	3 = 15
reflexive	82 = 8	9 = 3	71 = 9	2 = 100	0 = 0
adverbs	23 = 2	1 = 0	20 = 3	0 = 0	2 = 10
total	1070 = 100	288 = 100	760 = 100	2 = 100	20 = 100

The two adverbs with event based reference have specialized semantic specifications: they are *ligeledes* ('likewise') and *halvvejs* ('halfway'). *Ligeledes* is used in a characterization of a decision being discussed, and with a characterization of a previous decision of a similar kind as antecedent. The antecedent of *halvvejs* is *turen til Tel Aviv*, ('the trip to Tel Aviv').

The two pronouns with object based reference are two instances of the reciprocal *hinanden* ('each other') - here counted as reflexives - with *samtalen* ('the dialogue'), as antecedent, but no previous mention of the participants.

Finally, among the pronouns with direct reference, there are three instances of set-element specification by pronouns specialized for that purpose:

de to opfattelser <- begge ('the two conceptions <- both')
de to pladshalvdele <- hver sin ('the two halves of the square <- each POSS-REFL')
de fire plakatsøjler <- hver sin ('the four advertising pillars <- each POSS-REFL)

Full Definite Nominals

From Table 3 it is evident that full definite nominals with suffixed head nouns, with distal determiners, or elliptical nominals, are used for all types of antecedent relations, but not with equal frequency

Table 3: Frequency of Full Definite Nominals by Antecedent Relation and Type of Expression

N = %	Total	NoAnte	Direct	Object	Event
suffix	1153 = 54	236 = 58	567 = 72	190 = 46	160 = 30
distal	435 = 20	122 = 30	147 = 19	46 = 11	120 = 23
proximal	53 = 2	13 = 3	40 = 5	0 = 0	0 = 0
possessive	426 = 20	10 = 2	0 = 0	174 = 42	242 = 46
ellipsis	73 = 3	26 = 6	35 = 4	5 = 1	7 = 1
total	2140 = 100	407 = 100	789 = 100	415 = 100	529 = 100

Nominals with suffixed heads are used more with direct reference and less with object based reference and much less with event based reference than one would expect if one compares with the total. Nominals with distal determiners are used more without antecedents and less with object based reference than to be expected. Nominal ellipses are used more without antecedents or with direct reference (mainly set-element reference).

Nominals with possessive determiners are almost exclusively used with object and event based reference; the 10 instances without antecedents are all in idiomatic expressions. Proximal nominals are exclusively used with direct (actually· identical) reference if they are not exophoric.

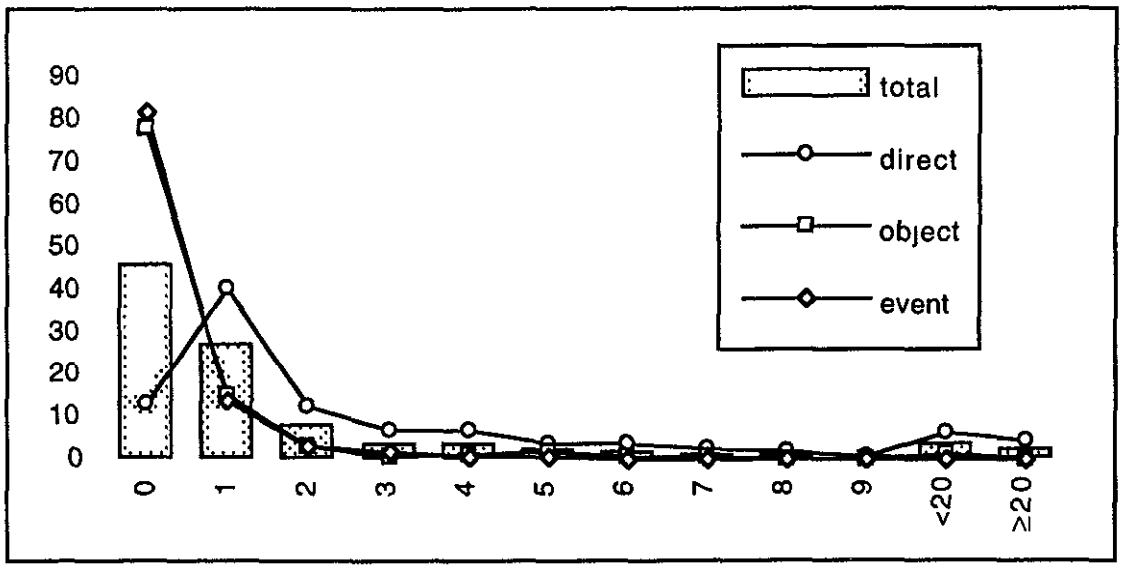
Differences in the expressions themselves can not explain these differences in their use with different antecedent relations, because no type of expression is tied to one type of relation only, and if some type of expression is not used with some relation, this is a question of its semantic specification (except for demonstratives). So, even though direct, object based and event based reference may be regarded as a sort of accessibility hierarchy, the type of relation between the intended referent and the antecedent is not signaled by the expression. It may be stated explicitly in a referential modifier, but the general rule is that the relation must be inferred in the retrieval itself, by finding the proper antecedent, rather than as a prerequisite for the search. The search is not guided by knowledge about the precise nature of the relation, only by the knowledge that some relation exists between the currently intended referent and the presupposed antecedent. Sometimes, with possessive

determiners, the antecedent is explicitly mentioned within the syntactic construction itself, but even there the particular type of relation between the antecedent and the intended referent must usually be inferred.

The differences in the preferences for particular expressions with particular relations reflect differences in the schematicity of the lexical specifications carried by the expressions. Unlike full nominals with preposed (distal, proximal or possessive) determiners, nominals with suffixed head nouns do not have premodifiers, so they are, *ceteris paribus*, more restricted in the degree of concreteness of specification that is possible. Therefore, when they are used with direct reference, their specification is quite often an abstraction with respect to the one used in introducing the referent in the first place (only the head noun is repeated, modifications are left out). With indirect reference the representation of the intended referents that is presupposed is highly abstract because the referents were not introduced explicitly

Nominals with possessive determiners are used only with non-direct reference. In fact, one might almost be tempted to accept that they signal non-direct reference. But actually, what they do is make explicit that some unspecified relation other than identity obtains between the two entities that are tied together in the construction, but it is not explicit what that relation is.

Figure 1.
Distribution of Full Definite Nominals with Different Antecedent Relations over Distances to Antecedent



In Figure 1 is shown the distribution of nominals with different antecedent relations over the distances covered in the retrieval. It is evident that direct reference allows the retrieval of less accessible (or at least, more distant) antecedents than object based reference, which again allows less accessible antecedents than event based reference.

Nominals with direct reference retrieve their antecedents from all distances, with the length of the text as maximum, and the preceding sentence as the preferred site. With object based reference, the maximum distance is 19 sentences, same sentence is preferred, and only in 7 instances (less than 2%) are antecedents retrieved from 5 or more sentences away Finally, with event based reference, the maximum distance is 5 sentences, same sentence is preferred, with only 2 antecedents (less than 1%) retrieved from beyond 3 sentences. If nominals with possessive determiners are disregarded (because their referential distance is always 0), event based reference has same and preceding sentence about equal (44% and 41%, respectively) while the change for object based reference is less dramatic. The antecedent events are often introduced "circumstantially" in the preceding sentence, rather being mentioned by a single nominal.

3.2.2. Reference Without Textual Antecedents

Table 4 shows the frequency of full definite nominals without textual antecedents by the type of reference that accounts for their definiteness. The vast majority are exophoric with a basis in general knowledge because the corpus consists of written texts, in which the "speech" situation is not so easily available as in face-to-face communication. A few are have generic reference, all of them suffixed nominals - modifications or possessive determiners are of course possible, but not common in words that designate a genus. Proximals, as might be expected, are used only with exophoric reference. Possessive constructions occur only in idioms: because there is always an explicit antecedent in the determiner, they are not counted as exophoric. The possessive nominal in the determiner may of course have exophoric or generic reference.

Table 4. Frequency of Full Definite Nominals without Textual Antecedents by Type of Reference and Type of Expression

N = %	NoAnte	Exophor	Generic	Idiom
suffix	236 = 58	183 = 56	14 = 100	39 = 59
distal	122 = 30	110 = 34	0 = 0	12 = 18
proximal	13 = 3	13 = 4	0 = 0	0 = 0
possessive	10 = 2	0 = 0	0 = 0	10 = 15
ellipsis	26 = 6	21 = 6	0 = 0	5 = 8
total	407 = 100	327 = 100	14 = 100	66 = 100

Table 5 shows the frequencies of pronouns and proper names over types of reference with no textual antecedent. It is hardly surprising that no generic reference was found with these expressions, or that exophoric reference is very predominant.

Table 5: Frequency of Definite Pronouns and Proper Names without Textual Antecedents by Type of Reference and Type of Expression

N = %	Total	Exophor	Idiom
personal	217 = 79	217 = 85	0 = 0
possessive	37 = 13	35 = 14	2 = 10
distal	24[1] = 4	2 = 1	9 = 45
proximal	0 = 0	0 = 0	0 = 0
reflexive	9 = 3	0 = 0	9 = 45
adverb	8 = 3	1 = 0	0 = 0
Pronouns	275 = 100	255 = 100	20 = 100
Proper Names	274	274	0

1. 13 instances of *det* ('it') used as a "provisional subject" have been included in the 24 distal pronouns without antecedents.

3.2.3. Direct reference

From Table 6 which shows the frequency of full definite nominals with identical and set-element reference, it is evident that elliptical nominals and nominals with distal determiners are preferred for set-element reference if one takes the total as the default expectation. The possibility for introducing contrastive specifications by means of premodifiers, which is absent for nominals with a suffixed head, explains this preference.

Table 6: Frequency of Full Definite Nominals with Direct Reference by Type of Antecedent Relation and Type of Expression

N = %	Direct	Identity	Set-Element
suffix	567 = 72	560 = 74	7 = 20
distal	147 = 19	130 = 17	17 = 49
proximal	40 = 5	40 = 5	0 = 0
possessive	0 = 0	0 = 0	0 = 0
ellipsis	35 = 4	24 = 3	11 = 31
total	789 = 100	754 = 100	35 = 100

With definite nominals that are elliptical in the narrow sense, i.e. where the head noun has actually been elided and the descriptor has not taken over the function of head, the descriptor is usually heard as contrastive, or additive, with respect to the specification being retrieved with the antecedent. Therefore, one of the core functions of elliptical nominals is set-element reference, not in the sense that the

type of expression is a signal of this, but because the construction is well suited for building semantic specifications that accentuate the essential features needed for this particular purpose: the retrieval of an antecedent together with a contrastive or additive specification that singles out the intended referent from the antecedent set.

From Figure 2 it is evident that with identical reference the maximum referential distance is the length of the text. The preceding sentence is the preferred location of antecedents, with the same sentence and 2 sentences away about even. Together these three distances cover 64% of all definite nominals with identical reference.

With set-element reference no antecedents are retrieved from beyond 4 sentences, and most antecedents are found within the same sentence.

Figure 2: Distribution of Full Definite Nominals with Direct Reference over Distance to Antecedent

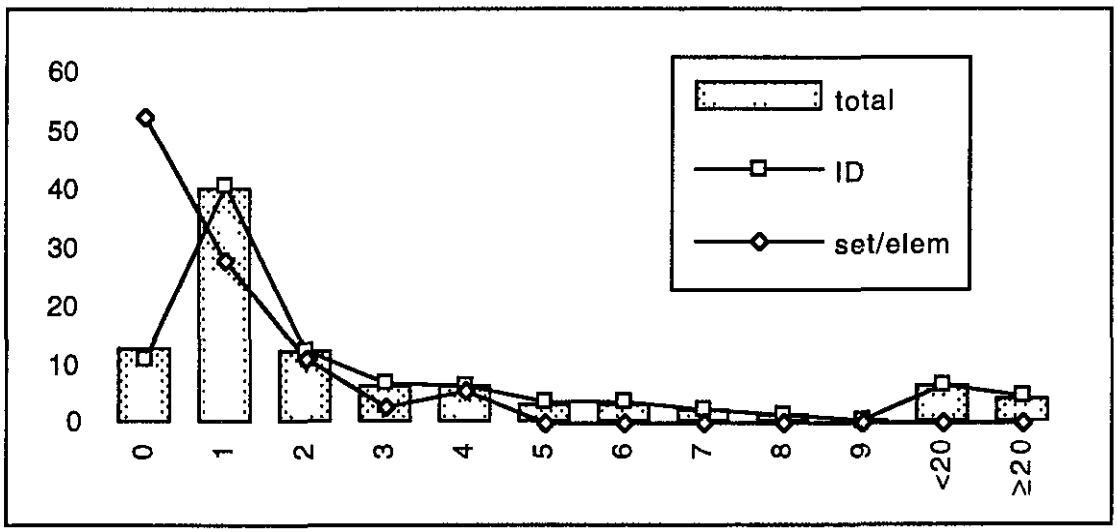


Table 7 shows the frequency of different types of nominal expressions by the different types of relations that occur in the retrieval of identical antecedents.

Table 7· Frequency of Full Definite Nominals with Identical Reference by Type of Lexical Relation and Type of Expression.

total N	Identity	Repetition	Synonymy	Abstract	Trope
suffix	560 = 74	463 = 85	57 = 60	33 = 35	7 = 35
distal	130 = 17	62 = 11	30 = 32	28 = 29	10 = 50
proximal	40 = 5	13 = 2	7 = 7	18 = 19	2 = 10
ellipsis	24 = 3	6 = 1	1 = 1	16 = 17	1 = 5
total	754 = 100	544 = 100	95 = 100	95 = 100	20 = 100

With repetition of the head noun, there is definitely a preference for suffixed nominals, while the other types of expressions, because they allow premodifiers to be introduced, are more favoured if synonyms, abstracts, or tropes are used. But all types of expression go everywhere, and the only explanation for the different preferences appears to be the different degrees of semantic specificity associated with the different expressions. With relations that are not based on previous mention of the expression itself, only of the intended referent, more semantic specificity is needed for the retrieval of the antecedent.

Figure 3: Distribution of Full Definite Nominals with Identical Reference over Distances to Antecedent

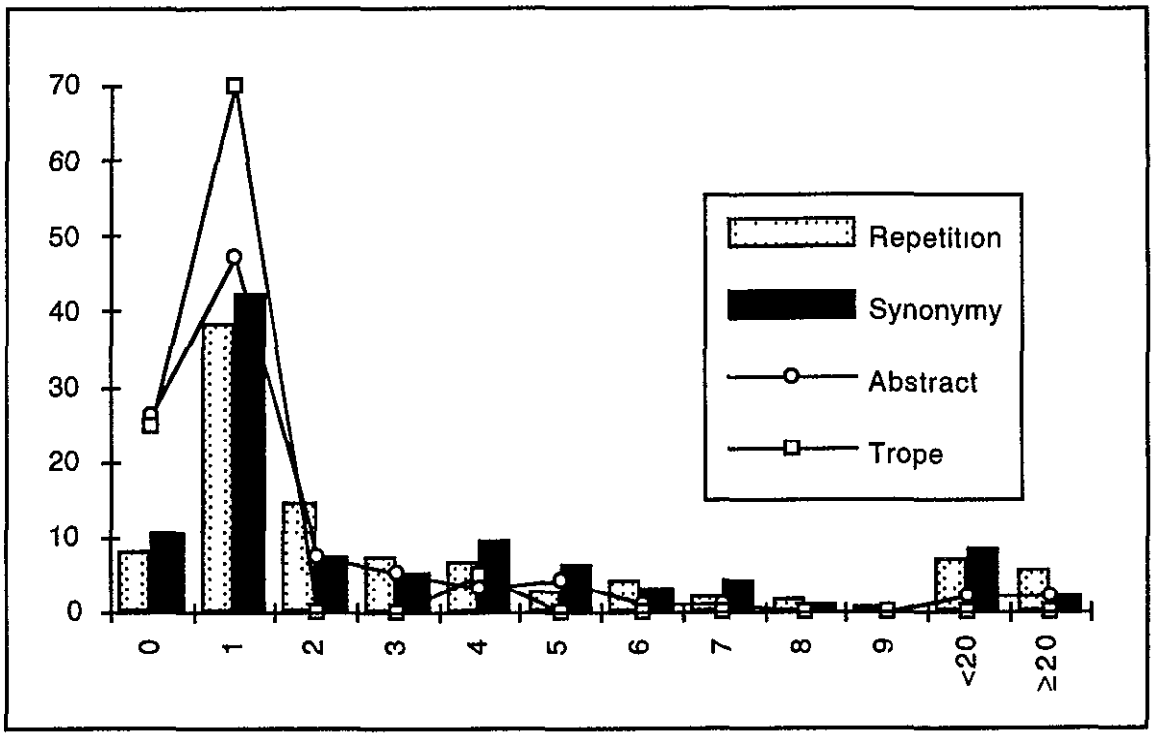


Figure 3 shows that with identity between the intended referent and the antecedent, antecedents are predominantly in the immediately preceding sentence, regardless of the lexical relation involved.

The relations (abstract and trope: epithet, metaphor, and metonymy) that involve higher schematicity of lexical specification in the referring expression than in the one used in the previous mention of the antecedent have same sentence as the second choice.

Of the relations that have more or less the same level of schematicity in the two expressions, repetition (same head noun) has 2 sentences away as the second largest category while same sentence is on the same level as 2 and 3 sentences away; synonymy has same sentence and 2 sentences away about even but with a slight preference for same sentence.

Tropes drop off quickly, 4 sentences away being the longest distance; the other relations last longer, with maximal referential distances beyond 20 sentences. But with abstract words only 6 (or 6%) of the antecedents are more than 5 sentences away; synonyms have 18 (19%) of their antecedents more than 5 sentences away, and repetitions have 117 (22%) of theirs beyond 5 sentences. 69 (or 13%) of the repetitions have antecedents beyond 9 sentences.

3.2.4. Object Based Reference

Table 8 shows the frequency of different types of full nominals with different types of object based antecedent relations.

Table 8: Frequency of Full Definite Nominals with Object Based Reference by Type of Antecedent Relation and Type of Expression

N = %	Total Object	Parts	Properties	Material	Function
suffix	190 = 46	155 = 58	31 = 23	4 = 57	0 = 0
distal	46 = 11	35 = 13	9 = 7	2 = 29	0 = 0
proximal	0 = 0	0 = 0	0 = 0	0 = 0	0 = 0
possessive	174 = 42	75 = 28	95 = 69	1 = 14	3 = 100
ellipsis	5 = 1	3 = 1	2 = 1	0 = 0	0 = 0
total	415 = 100	268 = 100	137 = 100	7 = 100	3 = 100

With antecedent retrievals based on part relations, suffixed or distal nominals are preferred relative to nominals with possessive determiners, and vice versa for property based references. But the distribution is far from categorial, and one cannot say that any type of expression signals some particular relation or is exclusively designed for it.

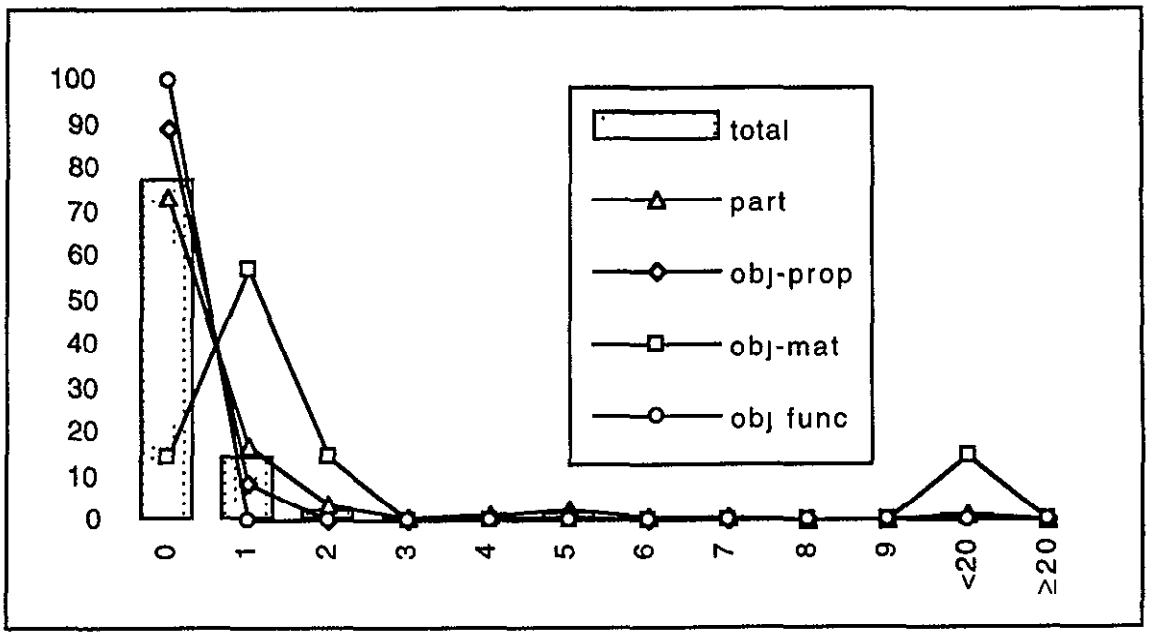
Figure 4 shows that with reference based on whole-part and part-part relations, the maximum distance covered in the retrieval of antecedents is 19 sentences. 90% find their antecedents in the same or the preceding sentence. With reference based on object-property relationships the maximum referential distance is 10 sentences, and only 3 instances need to look beyond the preceding sentence for their antecedents.

Parts and property based antecedent retrievals are quite common, but there are too few references based on object-material and object-function relations to warrant any safe conclusions (7 and 3 instances, respectively). Nearly all of them have antecedents within 2 sentences. Together with the scarcity, this might be taken as an indication that these two relations are cognitively costly

But one object-material based reference retrieves its antecedent at a referential distance of 19 sentences. The definite nominal in question is *det sorte klæde* ('the black cloth') and the antecedent is introduced by *klædt i sort* ('dressed in black').

Informal experiments confirm the suspicion that readers cannot retrieve antecedents based upon this relation at such distances without retrieving them in the text itself, rather than in the representation of it in memory Possibly the two expressions have drifted apart because of revisions of the text. Anyway, it must be admitted that if this reference is not an anomaly, it is a minor nuisance for the analyst.

Figure 4. Distribution of Full Definite Nominals with Object Based Reference over Distances to Antecedent



3.2.5. Event Based Reference

Table 9 shows the frequency of the different types of full nominals with different event based antecedent relations.

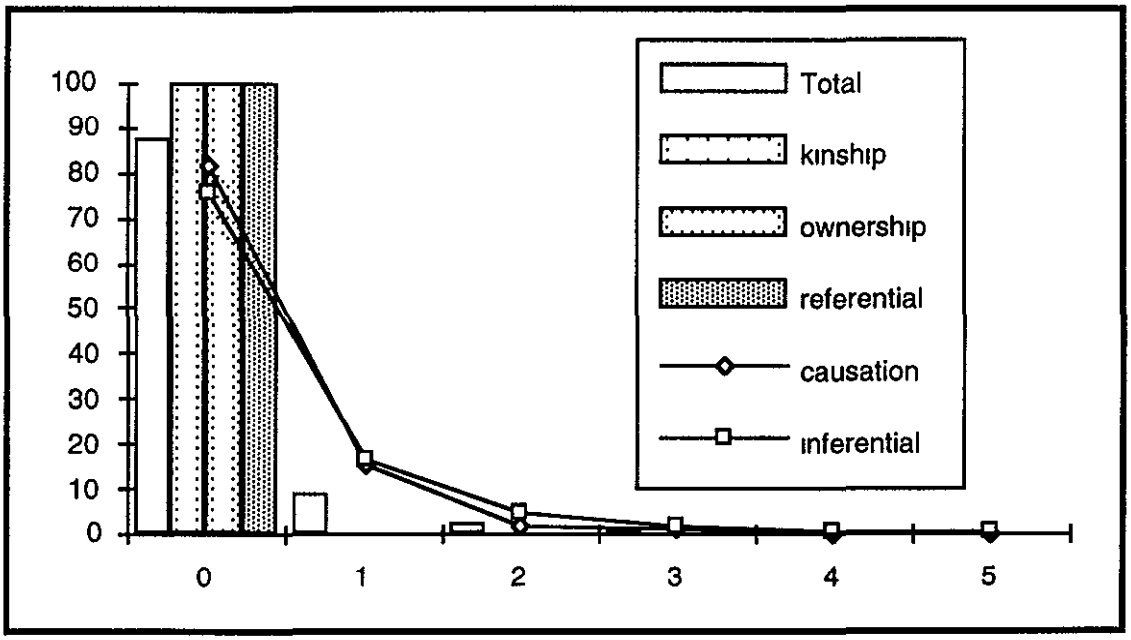
Table 9: Frequency of Full Definite Nominals Event Based Reference by Type of Antecedent Relation and Type of Expression

N = %	Total Event	Kinship	Owner-ship	Causa-tion	Infer-ential	Refer-ential
suffix	160 = 30	1 = 3	1 = 4	25 = 24	48 = 24	85 = 50
distal	120 = 23	0 = 0	0 = 0	4 = 4	32 = 16	84 = 49
proximal	0 = 0	0 = 0	0 = 0	0 = 0	0 = 0	0 = 0
possessive	242 = 46	30 = 97	25 = 96	76 = 72	111 = 57	0 = 0
ellipsis	7 = 1	0 = 0	0 = 0	0 = 0	5 = 3	2 = 1
total	529 = 100	31 = 100	26 = 100	105 = 100	196 = 100	171 = 100

Proximals do not contribute to event based reference. Kinship and ownership relations are found almost only in possessive constructions, that comprise both of the referents involved in the relation. Possessive constructions are also very dominant with causative and inferential relations, but quite absent from the group of nominals with referential modifiers, which nearly only consists of suffixed and distal nominals. Still, the picture is not that any type of expression signals any particular relation. The differences in the distributions of expressions reflect the need to provide the hearer with semantic information that is sufficient to match only the proper antecedent in the retrieval, rather than procedural 'price tags' that tell him its cognitive cost.

Besides, the antecedents in event based reference are all close as is evident from Figure 4, even those that are not syntactically restricted in their referential scope.

Figure 4: Distribution of Full Definite Nominals with Event Based Reference over Distances to Antecedent



The maximum retrieval distance for any nominal with event based reference is 5 sentences. All antecedents in the kinship and ownership relations are in the same sentence, the vast majority of them in possessive constructions, of course. Nominals with referential modifiers are like possessives, their antecedents are found within the structure of the nominal itself. 3 (3%) of the causation based nominals find their antecedents 2 or 3 sentences away, and none go beyond that. 15 (8%) of the inference based ones have antecedents 2 or more sentences back, with 5 as the longest distance. Same sentence is preferred with all event based relations.

The numbers of nominals with the different causation based antecedent relations are too small to warrant any safe conclusions. The only large groups are agent <- result, and event <- result. The first is only found with possessive constructions.

Most of the instances are really *author <- work-of-art*, and the group is so large because a number of reviews of books, movies, etc. were included in the corpus. With the other group, suffixed nominals are predominant. Most of the instances come from recipes: the results result from the cooking procedures described.

Table 10: Frequency of Full Definite Nominals with Causation Based Antecedent Relations

N = %	Total Causation	Event <- Cause	Event <- Result	Event <- Instr.	Agent <- Result	Result <- Agent
suffix	25 = 24	3 = 75	14 = 82	6 = 100	0 = 0	2 = 67
distal	4 = 4	0 = 0	4 = 18	0 = 0	0 = 0	0 = 0
proximal	0 = 0	0 = 0	0 = 0	0 = 0	0 = 0	0 = 0
possessive	76 = 72	1 = 25	2 = 0	0 = 0	72= 100	1 = 33
ellipsis	0 = 0	0 = 0	0 = 0	0 = 0	0 = 0	0 = 0
total	105 = 100	4 = 100	20 = 100	6 = 100	72 = 100	3 = 100

3.2.6. Summary of Antecedent Relations

Table 11 sums up the primary and secondary preferred referential distances as well as the maxima for the different antecedent relations. The most interesting finding here are that identical reference is different from all the other bases for reference by having no maximum referential distance, and that the maxima for object and event based reference are very different, for object based reference it is between 10 and 20 sentences, whereas event based reference does not exceed 5 sentences. Identical reference, in contradistinction to the other relations, does not prefer antecedents from the same sentence, obviously because intrasentential identical reference is most often achieved by a pronoun.

Another interesting finding is that there is a tendency that antecedent relations that prefer short referential distances are often accomplished by the use of complex nominals with very concrete semantic specifications: only when the antecedent relation is kept constant do more comprehensive specifications retrieve over longer distances. Apparently speakers use semantic specifications to create contexts in which the referents they intend are sufficiently highly accessible, that the hearers can retrieve them, rather than mark them as being difficult to find.

Table 11. Summary of Antecedent Relations

	PRIMARY PREFERRED DISTANCES	SECONDARY PREFERRED DISTANCES	MAXIMUM DISTANCE
Direct	1	0, 2	∞
Identical	1	0, 2	∞
Repetition	1	2 > 0, 3-4	∞
Synonymy	1	0, 2-5	∞
Abstract	1	0	∞
Trope	1	0	4
Set-Element	0	1	4
Object	0	1	19
Part	0	1	19
Property	0	1	10
Material	1	0, 2 (19)	2 (19)
Function	0	-	0
Event	0	1	5
Kinship	0	-	0
Ownership	0	-	0
Referential	0	-	0
Causation	0	1	3
Inferential	0	1	5

3.3 Discussion

As demonstrated in the previous section, the same types of expressions are used with identical as well as bridging references: the expressions as such do not contain information that could tell the hearer whether an identical or bridging reference is intended. Definiteness in itself only indicates that the referent is taken to be uniquely identifiable to the hearer, but says nothing about the actual means needed for the identification, much less the relationship between the intended referent and the presupposed antecedent.

And the referential distances covered in bridging are shorter than with identical reference. There are fairly well defined maximal distances, for event based reference of the same order as with pronouns.

Some grammatical constructions are more helpful in this respect than others, and some of those are used extensively, or even exclusively, in bridging: possessive constructions allow the intended referent to be explicitly tied together with its antecedent, and referential modifiers may also give the relation explicitly But they are not mandatory· other constructions, notably plain definite nominals, are also used extensively in bridging.

The reason that more complex nominals retrieve more remote antecedents is not that their complexity or size indicates the cognitive cost involved to the hearer The complexity is a result of the need for more precise semantic specifications in the retrieval of antecedents that are not highly salient in the current context.

In the remainder of this section, I shall present and discuss some proposals for the treatment of bridging references, including the proposals in the studies mentioned in sec. 2.3. Most of these studies do not investigate bridging references as a special category But bridging references are discussed in order to show that the models they propose will account properly for them. All assume that referents that need bridging inferences for their establishment are less accessible than identical ones, but the empirical basis for this assumption is not established independently of the theories proposed.

Togeby 1993

In his description of the procedure for the construction of mental models of texts, Togeby (1993) develops a rule to account for object and event based reference assignment. First a preliminary version of the rule is introduced to account for the fact that parts of wholes that are already in the mental model of the discourse may be introduced by a definite nominal. Then the rule is generalized to incorporate "all discourse object and relations that are metonymically related to the existing discourse object", and a number of metonymical relationships are enumerated and exemplified (cf. Table 1 in sec. 3.1).

Togeby further observes that, since it is true of these relations that the first word in the relation enables the second one, because the second presupposes the first, the rule can be further generalized, but that it is a problem that

enablement makes far too many discourse referents available for the addressee to incorporate in his mental model. Therefore the rule is restricted in its application to cases where it is needed, so that the final formulation of it becomes:

> "R.2.. If a discourse object or relation exists in the mental world, then all the objects and relations enabled by them also potentially exist; however, the potential objects and relations are only reconstructed when the need arises later in the text." (Togeby 1993: 327)[1]

This rule is not wrong, I think, but far too general to be really useful or informative: since the circumstances that give rise to the need for the reconstruction of a referent by bridging, rather than just the retrieval of an identical antecedent, are left in the dark, and enablement is logically necessary for presupposition, the rule applies to all uses of definite nominals and simply states the empirical fact that bridging between an antecedent and an intended referent is possible, but says nothing about how it is possible.

Ariel 1990

Ariel (1990) notes that although there is no corresponding unit in the discourse representation, inferred discourse referents are marked as accessible, i.e. definite nominals are used in reference to them. She classifies such referents as having low accessibility, because auxiliary assumptions retrieved from long-term memory are involved in the hearer's inferring of the referent. In her view, the reason that pronouns do not retrieve inferred referents is that they mark high accessibility, and "the need to actually produce a new mental entity necessarily lowers the degree of Accessibility which a speaker can attribute to the entity" (Ariel 1990: 185). But as noted in sec. 3.2 (cf. also Gundel et al. 1993), there are special circumstances in which nominals that consist solely of a pronoun or have a pronoun as head, are actually used in reference to inferred referents. This is possible when the semantic specification (derived from the lexical specification of the pronoun, possibly extended by modifiers) of such a nominal is sufficient in the context to yield a referent for the expression. The choice of grammatical category in itself is not a signal.

Ariel further claims that speakers distinguish two degrees of predictability for inferred referents: with script or frame based referents, such as a language in a human community or rooms in houses, the probability is close to 100% and a plain definite description is sufficient for reference; with inferences based on stereotypic assumptions ("Although, for example, many women have husbands, children, cars, etc., not all women necessarily have all or any of the above" Ariel 1990: 187) the probability is lower, and the referents to be inferred must be explicitly anchored to the antecedent in a possessive construction.

It is a problem, Ariel concedes, "that although the principles suggested ( ) are universal, since they are based on cognitive considerations employed in processing, there are some language-specific factors intervening", because it is

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[1] "R.2.. Eksisterer en motivgenstand eller et motivforhold i den mentale verden, eksisterer potentielt også alle de genstande og forhold de muliggør; de potentielle genstande og forhold rekonstrueres dog kun når der senere i teksten bliver brug for det."

unlikely that "body parts are frame-based for Hebrew speakers and regular lower-probability inferences for English speakers." (Ariel 1990: 190). It is probably even more unlikely that for Danish speakers not only body parts, but wives, husbands and cars, appear to be sometimes based on frames and sometimes on stereotypic assumptions, since they are often, but not always anchored in a possessive construction, as for instance in the traditional Danish children's rhyme:

Der var engang en mand.	('Once there was a man.
Han bo'de i en spand.	He lived in a bucket.
Og spanden var af ler	And the bucket was of clay
Og konen vasked' ble'r	And the wife was washing diapers.
og sønnen var barber	And the son was a barber.
Nu ka' jeg ikke mer	Now I don't know any more.')

or in the slogan used on several occasions and in slightly different versions by the Danish anti-EC movement:

Holger og konen si'r nej til unionen
('Holger and the wife say no to the union')

So if there is an obvious antecedent in the neighbourhood, possessives are not necessary; if there is not, they are very useful for introducing one. The speaker does not choose possessive construction as a 'price tag', but as a means of conveying the information that, in the view of the speaker, is sufficient for the hearer in retrieving the intended referent. Once the determiner is established, there is a highly accessible antecedent, and when the head has been spoken, there is a type specification for the intended referent as well, all that remains is to find the fit between them.

Gundel et al. 1993

In the theory proposed by Gundel et al. s (1993), reference by inference is not a separate cognitive status, but a way in which the intended referent achieves some status by association with an antecedent. Therefore inferrable (or bridging) referents have different statuses and may be coded by different forms. Inferrables can not usually be referenced by pronouns or demonstrative determiners, in accordance with the observation that they are usually uniquely identifiable at most, and not yet represented in memory, which would give them the status of familiar If the link between an inferrable referent and its antecedent is sufficiently strong to create or activate a representation of the inferrable, higher statuses and, thereby, reference by pronouns and demonstratives, become possible after all. That is, the speaker's task is to provide the hearer with the necessary means for establishing the intended referent: a sufficiently precise semantic specification to establish the type of referent, and the information that the referent is also uniquely identifiable.

Givon

In a similar vein, Givon (1992b) describes bridging reference as double-grounded frame-based reference in which reference is assigned to a definite nominal by recourse to an antecedent referent in the preceding text or in the speech situation, as well as to generic lexical knowledge of a frame or script

connected with that referent and of the sub-components of that frame. This type of reference is often accomplished through conventional knowledge of whole-part or possessor-possessed relations. The basis for frame-based reference is generically shared knowledge which is hierarchically organized, with subframes fitting into larger frames, and these again into metaframes (Givon 1992a). Activation of a frame spreads to its subframes, including potential referents, so that they are also activated, though to different degrees. Whole-part reference is a special, restricted case in which "the frame ITSELF - the WHOLE - is a text-based referent [which] then evokes ("activates") its parts, its relations, or its possessions" (Givón 1992b: 33).

The source for this conception of frame-based reference is Walker and Yekovich (1987) who observe that unmentioned central concepts in frames are available as antecedents regardless of the text's features whereas peripheral concepts depend on the text for their availability

In the model proposed by Walker and Yekovich (1987), frame-based knowledge is represented as a network of related concepts. Central concepts are those that are connected with many other concepts in the network, while peripheral ones have fewer connections. This means that central concepts will usually have higher activation levels than peripheral ones even if they have not been mentioned, because they receive relatively more indirect activation passed over from neighbours that have been activated directly (by being explicitly mentioned).

As noted also in sec 2.3, the major problem with this conception is, in Givon's own words, that it "[remains unclear] what triggers the choice of a PARTICULAR frame for a PARTICULAR task of reference." (Givon 1992b: 33). Givon concedes that - after all - "grammatical clues are only minimally involved in marking a definite referent as culture-based (1992b: 31) and that the need for parallel, interactive text-based and frame-based search implies that determining the source of definiteness and searching for reference are not distinct: that the hearer can only determine the source by finding a referent (1992a: 50, fn. 39). *More generally, the problem appears to be same (or another version of)* Togeby's problem that enablement *tout court* yields an indefinite, but too large number of possible referents.

Clark & Haviland 1977, Clark 1977

In their account of discourse comprehension, Clark & Haviland (1977) propose a Maxim of Antecedence, a general cooperative norm for speakers that they should make sure that listeners actually know the information that is conveyed as given:

"*Maxim of Antecedence*:

> Try to construct your utterance such that the listener has one and only one direct antecedent for any given information and that is the intended antecedent." (p 4)

Like violations of Gricean maxims, violations of the Maxim of Antecedence can be used by speakers to convey special types of information or they may come about as a result of the speaker's negligence or misjudgment of the listener's knowledge. In the first case, listeners are invited to draw inferences that are not

explicitly communicated if the violations are explicit, or they may be mislead or misinformed if they are covert. In the second case misunderstandings or incomprehensibility may result.

The given-new strategy for the understanding of sentences presupposes a representation of the discourse and other knowledge, partly inferred from the discourse and the extralinguistic context. The representation is a knowledge base with indications of what entities are identical, among other information. The strategy is a three step procedure that relates utterances to the representation of the discourse. In the first step given and new information in the utterance is sorted out, in the second memory is searched for a direct antecedent that matches the given information and in the third the new information is attached to the antecedent and thereby integrated into the discourse representation.

Violations of the Maxim of Antecedence lead the listener to apply the strategies of *bridging* and *addition* that compute or add proper antecedents at step 2 of the strategy if no direct ones can be found, and *restructuring* which rearranges the configuration of given and new at step 1 if other strategies fail.

With *bridging* the listener forms indirect antecedents by making implicatures that bridge between what he is being told and what he already knows. If this strategy fails, the listener uses *addition* of new referents to the discourse representation to serve as antecedents. Narratives that begin *in medias res* are the prototypical examples of contexts that require this strategy of the listener

These strategies are based on the assumption that the speaker is trying to be cooperative so that it is possible to make plausible inferences in order to make new information relevant in the context of given information. Violations of the Maxim of Antecedence are not necessarily uncooperative, if the listener is able to make the necessary inferences reliably on the basis of information he is known to have. If not he will be mislead, or will be unable to make sense of what he is being told. Therefore Clark & Haviland (1977) formulate a Given-New Contract that deals with the application of the maxim, and what it means if the speaker does adhere strictly to it:

"*Given-New Contract*·

> Try to construct the given and the new information of each utterance in context (a) so that the listener is able to compute from memory the unique antecedent that was intended for the given information, and (b) so that he will not already have the new information attached to that antecedent." (p 9

In his classic paper on bridging, Clark (1977) emphasizes that establishing identity between the antecedent and the intended referent requires inferencing as much as establishing other relations between them. He offers an inventory of anaphoric relations (cf. Table 1, sec. 3.1) and claims that the implicatures involved in bridging are based on the Given-New Contract, that they draw on knowledge of natural objects and events beyond the knowledge of language. He further observes that in natural discourse bridges are always determinate in length because there is a stopping rule for the inference chains that accomplish bridging:

> "Build the shortest possible bridge that is consistent with the Given-New Contract." (Clark 1997: 420).

In other words: the intended implicature is the one that requires the fewest assumptions, all of them in accordance with the listener's knowledge of the speaker, the situation, and facts about the world. Inference chains can only be build 'backwards', from the intended referent to the antecedent, not in the opposite direction, because 'forward' inferencing is not determinate.

In the final chapter, I shall propose a view of the representation of discourse and the process of discourse comprehension, that attempts to throw some light upon the problem of how it may be possible for the hearer to build the intended bridge in his search for a referent.

4. Outline of a Process Model for Discourse Comprehension

The view of discourse comprehension to be proposed here assumes that the mental representation of discourse from which antecedents are retrieved is a dynamic network of discourse referents, instantiated from lexical-encyclopedic specifications in long term memory, and representing the objects and events that are being talked about. Discourse referents may be related to each other in a number of different ways as demonstrated in chapter 3 Their specifications may have different degrees of schematicity and parts of the specifications may not be instantiated discourse referents, but rather constraints on the possible instantiation of referents that are as yet unmentioned, but nevertheless belong in the context in some way

The discourse referents may be differently activated for a number of reasons. The initial activation of referents depends upon the source of their introduction into the representation, which indicates local topics and non-topics. Activation decreases over time if the discourse referent is not reactivated, apparently by diminishing steps so that it never reaches zero, since for some types of definite expressions the maximum distance over which they may retrieve an antecedent is the length of the text.

The activation of a referent may be increased either by subsequent mention, or by activation spreading from connected referents in the representation. This means that larger parts of the network that are highly interconnected ("spaces") may be activated or deactivated more or less as wholes.

The process that resolves nominal anaphora attempts to match the specifications for the type of entity a definite nominal can refer to against the network of discourse referents in the mental representation, more highly activated (or salient) candidate antecedents being tried first. The specifications are built from material retrieved from the lexicon by means of the words that comprise the nominal. Full nominals yield fairly concrete specifications, while the specifications for pronouns and determiners are highly schematic. Besides specifications for the type of referent, pronouns and determiners carry instructions about the way in which the nominal should be processed.

Three aspects of this process will be discussed in the next sections:

1. the lexical-encyclopedic representation of the concepts for objects and events that are activated when an expression that matches the label of the lexical entry is encountered or when a matching specification has been constructed in the representation of the discourse or of a sentence being processed,
2. the construction of specifications for objects and events expressed by definite nominals or more comprehensive linguistic constructions; and
3. the building of a representation of the discourse as a network of object and event representations, with an emphasis on the information content,

specifically on information that is presupposed in the resolution of nominal anaphora.

4.1. Representations: Lexicon to Discourse Model

4.1.1. Lexical Representation of Objects and Events

It is assumed that the mental lexicon is encyclopedic (Haiman 1980, Langacker 1987), i.e. it is not possible (or useful) to draw any clear-cut borderline between knowledge of language and knowledge of the world. Or, alternatively, one must at least accept that both kinds of knowledge are heavily involved in discourse processing and specifically in the resolution of anaphora.

4.1.1.1. The Representation of Concepts

Cognitive Semantics regards the concepts that form the semantic content of words as schematic networks consisting of prototypical and schematic units related by categorizing relationships (Lakoff 1987, especially Case Study 2: *Over*, Langacker 1987, 1988). Connected units with different degrees of schematization (from different levels of abstraction) may have *schematization* or *elaboration/instantiation* relations to one another And units that are different from one another but have shared subschemas are related by unidirectional *extension* links or by bi-directional *similarity* links. Links may also be *transformational*, if the units have related subschemas (such as a shift in focus from path to end-point). And - of course - metaphor and metonymy may further extend the network.

Such networks are taken to have full specification of all the schemas involved so that words in the context *match* specifications that are already in store (Lakoff 1987 420ff). With minimal specification only the central schema would be represented in the lexicon, whereas all the others would result from specifications *added* (generated) by words in the context. In that case, the links between different schemas should be stated as rules for the generation of schemas from the central prototype. But the non-central schemas are not predicted from the central prototype by rules for elaboration, extension, etc. Rather, they are motivated by links in the sense that one can understand and even explain them when they are encountered, but one cannot know what schemas will be missing from the network even though they might be motivated. If the links were generative rules all the possible schemas would have to be generated, whether they were ever realized in the language or not.

The important thing about the concept of motivation with respect to the retrieval of antecedents is that it allows entities to belong to the same category while differing slightly in certain aspects of their specifications, rather than requiring of them that the relation must be strict identity or abstraction. And by extension, one may see the bridging relationships between definite nominals and their antecedents as motivated links, even in the sense that they are not instantiated unless it is necessary for the comprehension of an expression.

4.1.1.2. Lexical Entries

Lexical entries must have a label that matches an expression so that the conceptual content of the entry can be activated when the proper expression is encountered. Or, vice versa, so that the conceptual content can be expressed when the need arises. Activation may result from a matching specification, rather than an expression.

Furthermore, lexical entries must have a component that specifies what sort of real world entities can be referenced by using the expression in question. There are definitely other aspects to the conceptual content as well, e.g. components that are used in the perceptual recognition of entities, but they will not be discussed here.

Finally, the lexical specifications of pronouns and determiners contain instructions for the processing of the nominal in question in terms of indications of the cognitive status of the referent: if the nominal is definite the intended referent should be uniquely identifiable, and if is indefinite it should be only type identifiable. If it is demonstrative either a non-default referent is intended or a non-default relation besides identity of reference obtains between the intended referent and the antecedent.

For the sake of brevity and convenience, labels for entities are used in the examples, rather than specifications proper, in places where lexical specification deals with component entities. This should not be taken as an indication that such entities will or must be instantiated in the discourse representation. the labels are intended to represent constraining specifications for events or objects, not the entities themselves. The entities will, however, be available for subsequent mention by a definite nominal.

Also, the framelike format in which specifications are given is not intended as a claim about the format of the mental representation, only its information content: if there is a way to extract information about parts, properties, etc. from a 3D model, the specification of an object could be a 3D model; and if there is a way to extract information about subevents and participants from an image schema, the specification of an event could be an image schema. And if my imagination had been visual, rather than verbal, pictures like Langacker's might have been useful.

Grammatical gender, which is of some importance for the resolution of anaphora, especially if the definite nominal being processed is a pronoun or ellipsis, has been put into this specification because of its interaction with sex which is definitely a property of the possible referents and therefore belongs with the specification and which usually overrides gender in pronominal reference if it is applicable. This is a somewhat arbitrary decision, because gender, in Danish anyway, does not appear to be necessarily related to properties of the possible referents in any perspicuous manner (cf. Mikkelsen 1894. §§ 74-79, Diderichsen 1966: § 42). While there are tendencies and probabilities that particular types of things are expressed with nouns of one or the other gender, there is also an abundance of exceptions to all of them, even in the one area where gender is productive to some degree in Danish: a shift between count and mass construal of a noun may be indicated by a gender shift: *øllen* ('the [bottle of] beer') vs. *øllet* ('the [substance of] beer'). Mass nouns

may be common (*mælken* ('the [jug | substance of] milk'), and count nouns may be neuter (*jernet* ('the [tool | substance of] iron'), in both cases preventing a shift of expression to accompany the shift of construal. So gender could also have been viewed as an aspect of the expression and located with the label.

Objects

In concepts for objects, the specification has components that specify the parts of the type of object in question and the material it consists of (cf. Jackendoff's (1992) PART, CONT(aining), COMP(osed of), and GR(inder) functions, and Pustejovsky's (1991, 1992) constitutive role), as well as its properties (Pustejovsky's formal role), and the functions that the object can be put to (Pustejovsky's telic role).

Lexical Specification of an Object

label: KO ('COW')

specification:

gender:	common
sex:	< female | undefined >
parts:	head, tail, legs, body,
properties:	colour, size, weight, smell
material:	beef; flesh, bones,
function:	milking,

Events

In concepts for events, the specification has components that specify the subevents (that may sometimes be objectified and expressed by a nominal) that comprise the event, and the (object) participants in the event in terms of their relation to it (cf. Talmy 1975, 1976, 1985).

Lexical Specification of an Event

label: (causation)

specification:

gender:	
subevents:	cause, result
participants:	agent, instrument,

Relational words designate the role of the intended referent with respect to some other entity

Lexical Specification of a Relational Concept

label: VEN ('FRIEND')

specification:

gender: common
sex: < male | undefined >

event: friendship
participants: **FRIEND**$_1$, friend$_2$, friend$_3$,

Lexical Specification of a Relational Concept

label: ÅRSAG ('CAUSE)

specification:

gender: common

event: causation
subevents: **CAUSE**, result
participants: agent, instrument,

Lexical Specification of a Relational Concept

label: FARVE ('COLOUR')

specification:

gender: common
sex:

parts:
properties: **COLOUR**, size, weight, smell
material:
function:

Pronouns and Determiners

With pronouns and determiners quantification and cognitive status is lexicalized together with gender/sex. Quantification interacts with gender/sex: if the referent is specified as plural, the distinctions between the genders and sexes are suppressed in the expression.

Lexical Specification of a Singular Definite/Distal Pronoun/Determiner

label: DET ('IT)

specification:

gender: neuter
sex:

quantification: singular
status: unique

Lexical Specification of a Singular Personal Pronoun

label: HAN ('HE')	
specification:	
gender:	...
sex:	male
quantification:	singular
status:	unique

Lexical Specification of a Plural Definite/Distal Pronoun/Determiner

label: DE ('THEY)	
specification:	
gender:	...
sex:	...
quantification:	plural
status:	unique

4.1.2. Specifications for Nominals in Discourse

Nouns schematically provide lexical specifications for the types of things (prototypically: physical objects) they can be used to refer to. The incorporation of a noun as head in a nominal may be used to narrow down such specifications by adding modifiers to the noun. By means of grammaticalized devices (quantifiers and determiners), nominals further indicate the quantity and cognitive status of the intended referents.

Pronouns also function as heads of nominals, but they are restricted in their capacity for modification, because they take only postmodifiers and most often they are not modified at all. The lexical specifications provided by pronouns are of a very schematic nature, in the most frequent pronouns it is restricted to gender/sex/number and cognitive status of the intended referent, all of them inherent in the lexical specification from which the specification of the nominal is derived.

Full Nominals

Nominals prototypically designate instantiations of things, whose specification is provided by the head along with the modifiers (adjectives etc.) that make the specification more precise (Langacker 1987). Type specifications narrow down the set of instances (the *reference mass*) that can be referenced by the nominal. But only in special cases (most notably with proper names and 1st and 2nd person pronouns) do they single out only one possible referent without recourse to the representation of the discourse.

Specification for a Definite Nominal (den røde ko ('the red cow'))

specification:	
gender:	common
sex:	< female | undefined >
parts:	head, tail, legs, body, ...
properties:	colour: red, size, weight, smell ...
material:	beef; flesh, bones, ...
function:	milking, ...
quantification:	singular
status:	unique

Nominals further incorporate some specification of the quantity of the intended referents, in absolute terms or relative to the specified reference mass, and they effect the grounding of instances, relating them to the speech event and its participants, or to some reference point which is already grounded and salient in the discourse.

Type specifications are built out of lexical material, whereas the specifications of quantification and cognitive status are indicated by grammaticalized devices. As demonstrated, lexical and grammatical cues both have important roles to play in the retrieval of antecedents for the intended referents of definite nominals.

The main function of grammatical cues is to guide hearers in the choice between establishing a new discourse referent of the specified type or searching for a referent in the representation of the discourse which can be used in assigning reference to the definite nominal.

The main function of the lexicon-based type specification is the establishment of a discourse referent in accordance with the indication of cognitive status. If the referent is already grounded, as it should be when a definite nominal is used, the type specification is used for assessing candidate antecedents, which must conform to the specified type; and if the referent is marked as new (as with indefinite nominals) the specification is used for establishing the new referent in the discourse representation, which also must conform to the type.

Events are prototypically expressed by verbs or more complex expressions, but if they are construed as things, nouns and nominalizations can be used as well. And the components of events may be objects as well as subevents.

Specification for a Definite Nominal
(strømmens virkning ('the effect of the current'))

specification:	
gender:	common
event:	causation
subevents:	CAUSE. **strømmen** ('the current'), RESULT· **virkningen** ('the effect')
participants:	agent, instrument,
quantification:	singular
status:	unique

Elliptical Nominals

Because of the missing head, a full specification can not be built directly from an elliptical nominal. Like a pronoun, the determiner provides a schematic specification of gender/number and cognitive status, but the main bulk of the specification must be retrieved from the discourse representation. If the ellipsis is definite, the specification is usually retrieved from the antecedent that anchors its reference, but, as in the only elliptical long distance retriever in the corpus, "reference antecedents" may be different from "specification antecedents" And with an indefinite ellipsis there will not be any "reference antecedent", of course.

Specification for an Elliptical Nominal (den røde (' the red [one]'))

specification:	
gender:	common
sex:	
parts:	
properties:	**colour: red**,
material:	
function:	
quantification:	singular
status:	unique

Pronouns

The specification for nominals that consist only of a pronoun is simply a copy of the pronoun's lexical specification.

Specification For a Nominal Consisting of a Pronoun (det ('it'))

specification:	
gender· sex:	neuter
quantification:	singular
status:	unique

4.1.3. Representation of Discourse Referents

The representation of discourse referents is derived from the specifications for definite nominals. From them they retain type and quantification specifications, but information about cognitive status, which is used as an instruction for the processing is omitted, and an activation level is added. The initial level of activation depends upon the saliency or topicality of the referent (Sidner 1983, Grosz and Sidner 1986, Carter 1987). The activation decreases in diminishing steps over time, and "space builders" (Fauconnier 1985, Kamp 1982, 1988) may be used to increase or decrease the activation of connected complexes of referents (mental spaces) as wholes.

In the presentation, I shall confine myself to just three levels of activation: *high, mid*, and *low* (sometimes indicated by giving the labels for entities in small caps and boldface letters: **HIGH**, **mid**, low). These are just labels and are used only as a matter of convenience and are not intended to indicate that there are in reality only three levels of activation: With respect to its reflections in language use, activation is a scalar phenomenon. It may be that it is discrete at some level of implementation, but then it has far more levels than those that are expressed. This does not necessarily contradict Givon's claim that attention is limited to one item: Attention may be a "winner takes all" device, applied to the non-discrete activations in the mental representation of the discourse.

When an indefinite nominal is encountered in discourse, a new referent is introduced into the discourse representation by insertion of the type and quantification specification for the indefinite nominal as a representation of the referent at the currently active node. The referent is then activated at a level corresponding to processing instructions derived from the introducing expression.

When a definite nominal is encountered, the specification of its type and quantification is merged with the antecedent's specification, so that information already present in the representation is retained and new information is added to it at the proper location. The referent is then activated if it was not previously instantiated, or reactivated if the instance was already there, i.e., its activation level is adjusted according to the processing instructions.

Activation spreads to other discourse referents that are connected with currently activated or reactivated referents, according to the activation level and the ties between the referents in question (Walker & Yekovich).

Specification of a Discourse Referent

(en flok køer ('a herd of cows'))	
specification:	
gender:	common
sex:	< female ! undefined >
parts:	head, tail, legs, body,
properties:	colour, size, weight, smell
material:	beef; flesh, bones,
function:	milking,
quantification:	plural
activation:	

4.2. Retrieving Antecedents and Establishing Discourse Referents.

4.2.1. Searching for Antecedents

When a definite nominal is encountered in discourse indicating that the speaker believes the intended referent to be uniquely identifiable to the hearer, a search for an antecedent that matches the specification of the nominal is conducted among the discourse referents in the discourse representation.

In computational linguistics, discourse referents are usually taken to be partially or completely ordered by various principles so that the search may proceed by that order and stopped as soon as a match is found, thus making the search determinate while keeping the cost of computation at a minimum. Psychologically oriented studies more commonly talk about the referents as being differently activated as a function of the same or similar factors.

Ariel sums up the factors that contribute to Accessibility, i.e. to the activation or ordering of the possible antecedents, in the following manner:

"a Distance: The distance between the antecedent and the anaphor (relevant to subsequent mentions only).
b Competition: The number of competitors on the role of antecedent.
c Saliency· The antecedent being a salient referent, mainly whether it is a topic or non-topic.
d Unity· The antecedent being within vs. without the same frame/world/point of view/segment or paragraph as the anaphor " (Ariel 1990: 28).

With a direct view to computer implementation, Grosz and Sidner (1986) propose an attentional structure, separate from other structures in the discourse representation, and specifically dedicated to the search for antecedents. It consists of Focus Spaces (corresponding to Ariel's unity factor), each comprising the referents that are relevant to a particular Discourse Segment Purpose, ordered by salience according to sentence-level centering devices and more global focusing mechanisms.

The spaces are pushed onto a Focus Stack when they are initiated, and popped from it when new spaces contribute to higher order purposes (in practice apparently· when an antecedent is requested that is not in the topmost space). This can be seen as an implementation of Ariel's distance factor, but it is actually more complex than that, because the possibility of popping a space from the stack means not only that non-current spaces and the referents they contain may be ultimately available, but momentarily inaccessible. Spaces may be removed from the stack entirely, so that the referents are no longer available as antecedents, even though they are retained in the other structures in the representation of discourse.

Ariel's inclusion of competition among the factors that contribute to accessibility indicates that there is something wrong with her conception of the process that assigns reference to definite nominals. While competition between candidate antecedents obviously makes it more difficult to find the intended one (and therefore increases the cognitive cost of the retrieval), it cannot contribute to the ordering or activation of antecedents, and there can be no competition between candidates that are not equally accessible.

While important, the ordering of referents by accessibility is but one means of reducing competition. It ensures that it will not be necessary to decide among all previously introduced referents at the same time. But the ordering imposed by accessibility is not necessarily complete, so that even if the reduction of competition may be radical, it will not always be quite sufficient.

Remaining competition can be further reduced by using expressions whose type specifications are concrete enough to make them choosy about their matches; and if that is not sufficient, further reduction can be obtained by pragmatic inferences based on relevance considerations (Matsui 1993), often assisted by the use of marked expressions such as stress and demonstratives. But accessibility has to be a property of the representation of the antecedents, it cannot depend on the specifications used in the retrieval.

So the function of accessibility is to reduce the number of candidates offered at any point in the search for an antecedent, the function of the type specification is to reject non-matching candidates. The result of the interaction between these two processes (if it succeeds) is the achievement of definite reference by the specification of a set which has just one member considering the speech situation and the previous discourse. The function of pragmatic inferences is to reject implausible discourse models that results from possible reference assignments, especially if the set of candidate antecedents has more than one member.

4.2.2. Activating a Referent

The reactivation of a referent or instantiation of a new one specified by a definite nominal depends on two factors: there must be a match between the specification of an antecedent in the representation of the previous discourse and the specification constructed from the nominal, and the activation that results from the match must exceed a triggering level.

Matching between the two specifications involved is achieved by superimposing the specification conveyed by the definite expression upon the

specification of candidate antecedents in the representation of the discourse. If there is sufficient overlap between the specifications, according to the criteria listed below, and the resulting activation is above the triggering level, the match succeeds, and the merged specifications are activated or reactivated. Pragmatic criteria may be used to decide between equally activated referents if more than one matches the type specification. And they may prolong the search or give rise to requests for repair if the result is incomprehensible (not plausible).

The resulting activation comes about as a function of the activation of the antecedent and the incrementing force of the definite nominal which is related to its degree of specification, because the greater the overlap between the specifications in terms of items matched, the greater the incrementing force.

Nominals with highly schematic specifications, such as pronouns, contribute little more than the match itself to the resulting activation, because there are few items in their specifications. Therefore they will be unable to trigger a match with a low activation antecedent. On the other hand, pronouns are promiscuous: the schematic specification that limits their referential scope, does not provide them with any high potential for resisting a match, and therefore they will usually find one among the most highly activated antecedents.

Nominals with high specificity, either from the head noun alone, but often augmented by modifiers as well, contribute many items that can be matched and may therefore contribute considerably to the activation as well. Such nominals can effect a match relatively independently of the activation of the antecedent. And they are not promiscuous: the high specificity gives them a high potential for rejecting a proposed match. For these two reasons, they are capable of retrieving very distant antecedents.

Direct Reference

With direct reference, the antecedent is always an instantiated referent with a full specification. If the reference is intended to be identical, all sorts of definite nominals except possessive constructions are used. When set-element reference is intended only suffixed, distal and elliptical nominals occur in the corpus.

Matching criteria for identical reference:

1.1	all items in the type and quantification specification of the nominal have counterparts in the specification of an instantiated antecedent, or
1.2	if there are extra items they are either a. insignificant for reference (peripheral or attributive), or b. motivated (in the sense of Langacker and Lakoff).

The first criterion yields identical reference by repetition of the head noun and by the use of exact synonyms (if they exist), abstract words and pronouns, and it excludes the use of a more concrete word when the intended referent is identical to the antecedent.

The second criterion will yield identical reference even in cases were the specification of the nominal is not entirely included in the specification of the

antecedent. If identical reference results from the use of synonyms or near synonyms, the extra items in the specification are seen as peripheral. If modifiers are added, they are understood as attributive. And if identical reference comes about by the use of epithets and metaphors, extra items will be seen as motivated - and as information that is more to do with the speaker's attitude to or view of the referent than the referent itself and its prototypical properties.

Matching criteria for set-element reference:

2.	some items in the type or quantification specification from the nominal are added and/or contrastive with respect to the specification of an instantiated antecedent, and the antecedent can be construed as plural, and a. the quantification specified in the nominal quantifies within the antecedent set, and/or b. the added or contrastive item in the type specification of the nominal specifies a subset with a particular property within the antecedent set.

These criteria yield a referent which is a subset or element of the antecedent set. As noted, the corpus has only suffixed, distal, and elliptical nominals with set-element reference; no pronouns with postmodifiers were found with this function, nonetheless, they are possible. In all of these constructions postmodifiers may express the items that sets off the intended subset within the antecedent set. With distal and elliptical nominals the contrastive items can be expressed by a premodifier, with non-modified, suffixed nominals it is inherent in the lexical specification of the noun, i.e. either a relational word or a more concrete word is used. Quantification may be added or changed by a quantifier or a singular determiner.

Object and Event Based Reference

With object and event based reference, the antecedent is not an instance, but an uninstantiated component of the specification of an instantiated discourse referent.

Matching Criteria for Object and Event Based Reference

3.	the specification of the antecedent which constrains possible instantiations is a non-instantiated component of the specification of an instantiated discourse referent, and the specification of the nominal satisfies those constraints

With object based reference the antecedent specifies either a part, property or function of the object in question, or the material or ingredients of which it consists, and the intended referent is an instance that conforms to that specification. If the intended referent is not a part or ingredient, most often a relational concept is used and possessive constructions are more than averagely common.

With event based reference the antecedent specifies either a subevent or a participant in the event, and the intended referent is an instance that satisfies the constraints given. Relational concepts are used a lot and so are possessive constructions.

Such uninstantiated antecedents may have different activations, depending on the activation of the specification of the instance of which they are components, and on their centrality in that specification. Agents, e.g., are more central in causative events than instruments, and therefore agents are more highly activated than instruments, even when they are uninstantiated, and more probable as future instantiations.

But uninstantiated antecedents do not usually have a high level of activation, and will depend more on the activation potential provided by the specification being matched. Therefore it nearly always takes a full nominal to effect an instantiation by a bridging reference.

Instantiated referents have a fairly high level of activation at the time of their introduction, and therefore they will usually have a much higher potential for reactivation if they have not "faded" too much over time, or have ended up behind impermeable or semi-permeable borders. In such a case matching depends less on the activation potential of the specification from the definite nominal being processed, any match will suffice to activate the antecedent.

4.2.4. Classic Example

To illustrate this sketch, consider the following examples, inspired by the classic one in (Clark 1977):

Context 1.	Context 2:
John died yesterday	John was murdered yesterday
* a. Paul got away	a. Paul got away
* b. He got away	* b. He got away
* c. The man got away	?? c. The man got away
* d. The bastard got away	? d. The bastard got away
?? e. The man who did it got away	e. The man who did it got away
? f. The murderer got away	f. The murderer got away
g. His murderer got away	g. His murderer got away

In Context 1., continuations a. - d. do not connect to the preceding sentence, while e. and f. may be connected, but appear somewhat odd. In Context 2., continuations a., e., and f. connect to the context, but in different ways; b. does not connect, while c. and d. may, but are odd. Continuation g. connects in both contexts. The picture is like the one you get when looking at the corpus: nominals with less schematic specifications (e., f. and g.) take referents that require bridging inferences more easily than more schematic ones (c. and d.); pronouns - which are the most schematic ones - have difficulties with such referents; and, of course, proper names behave in special ways.

The two context sentences may describe the same event in some cases, but if they do the perspectives or construals are very different. With the intransitive verb *die*, the experiencer, John, is the figure of the event and surfaces as the subject of the sentence. The cause of death is not an internal event: if it is mentioned at all it is a peripheral participant, which can only be explicated in a prepositional phrase. Even when the cause is explicit it must be construed as inanimate: if agents are involved other verbs must be chosen, even if the causing act is seen as unintentional.

John died
John died of old age/a knife wound
**John died of murder/a murderer*
**John died of an accident/a jaywalker*

Accordingly, in the mental representation of a dying event, the experiencer (the person dying) will have a high level of activation, while the cause of death will be of a very low degree of activation, unless it is specifically mentioned.

Discourse Representation of Context 1 ('John died yesterday')

event: dying
participants: **EXPERIENCER**: John (male, singular)

With the transitive *murder*, not only the experiencer (figure of the resulting event and surface object in active sentences), but also the agent (figure of the causing event and surface subject in active sentences) are central participants, and both are high in the animacy hierarchy: if the act of killing is not construed as illegal (intentional and inflicted by a human upon another human with rights to protect him or her), the proper word is *kill*, not *murder* Likewise, it is only with *kill*, not with *murder* that instruments can surface as subjects or be attached by *by*

John was killed by a lion
**John was murdered by a lion*
The pig was killed by the butcher
**The pig was murdered by the butcher*

The bullet killed John
**The bullet murdered John*
John was killed by a bullet
**John was murdered by a bullet*

Therefore, even when the agent is left unmentioned and no referent can be assigned immediately, the mental representation will have an activated "slot" for the acceptance of this assignment. Being low on the animacy hierarchy, the instrument is a peripheral participant: it can be mentioned only in a prepositional phrase, or it can be left out entirely, even in an unmarked construction. If no experiencer is mentioned (as in "Paul murders") the implication is that there is not a single murder event, but that Paul is a habitual murderer (or a professional one?).

Discourse Representation of Context 2 ('John was murdered yesterday')

event: ('murder')

subevents: result: dying
participants: **EXPERIENCER**: John (male, singular)
cause: ('agent act upon experiencer with instrument)
subevents: result: ('instr. inflict upon exp ')
cause: ('agent act upon instr ')
participants: **agent**,
EXPERIENCER: John (male, sing,),
instrument

participants: **agent**
EXPERIENCER: John (male, singular),
instrument

Besides this construal that highlights the experiencer (due to the passive construction), the murder event has several others in which the participants are differently salient:

Paul murdered John with a knife	[AGENT,	INSTR,	EXP]
John was murdered by Paul with a knife	[AGENT,	INSTR,	EXP]
Paul murdered John	[AGENT,	Instr,	EXP]
John was murdered by Paul	[AGENT,	Instr,	EXP]
John was murdered with a knife	[**Agent**,	INSTR,	EXP]
John was murdered	[**Agent**,	Instr,	EXP]

In neither of the two context sentences is there an explicit referent for the role of agent or cause. The difference is that in Context 1. the cause is an external event that does not figure (at least not prominently) in the representation of the dying event which in consequence does not have the participant role of agent either In Context 2. the representation of the murder event has a specification of the causing event and its agent as necessary components. Therefore the representation is prepared for an instantiation of the agent, even if the agent is unknown or unmentioned for other reasons. An instrument can be inferred as well, but it is not a central participant. This difference provides one reason for the difference in the possibility of connecting the continuations in the examples to their contexts. Another prominent one is the specificity of the referring nominal. And a third is to do with relevance considerations.

Discourse Representation of Continuation a. ('Paul got away')

event: escaping from [EVENT]

participants: **AGENT**· Paul (male , singular)

In Context 1. the problem with continuation a., *Paul got away*, is not to establish a referent for *Paul* *Paul* has no identical antecedent in Context 1., but *Paul* is a proper name and a referent can and will be assigned irrespective of the textual context. Rather, the problem is to establish a connection between the representations of the two sentences either by assigning a participant role for

Paul in the context or by finding an event for him to get away from. Context 1. does not specify any participant roles that are not filled and the death of somebody else is not commonly construed as an event that one escapes from. So continuation a. can not connect to Context 1. because *Paul* refers to someone else than John and there is neither a role for Paul, nor an event to get away from.

Discourse representation of 2 + a.

event: escaping from [event ('murder'):
subevents: result: dying
participants: **EXPERIENCER**: John (male, sing.)
cause: ('agent act upon experiencer with instrument)
subevents: result: ('instr inflict upon exp.')
cause: ('agent act upon instr ')
participants: **agent**
EXPERIENCER: John (male, sing.), Paul (male, sing.)
instrument
participants: **agent**,
EXPERIENCER: John (male, sing.), Paul (male, sing.),
instrument]
participants: **AGENT**· Paul (male, sing.)

In Context 2. the connection is established via the murder event, which is indeed an event to try and get away from, for agents as well as intended experiencers. If the sentences are read as connected, Paul takes the same role as John in the murder event, as experiencer, with the difference that the attempt on his life was not successful because he escaped. The specifications for *Paul* can not of their own prevent the merge between Paul and the agent role of murderer, but considerations of informativeness should get the speaker to state explicitly that Paul murdered John if this was known to be the case, and therefore PAUL-AS-AGENT is not the preferred reading.

Discourse Representation of Continuation b. ('He got away')

event: escaping from [EVENT]
participants: **AGENT**· (male, singular)

Continuation b., *He got away*, does not connect in either context, because it is not possible to assign reference to *he*. Because it is a pronoun, *he* must find an antecedent in the context, John is the only candidate, and the specifications match. But since he did not get away from the event he was experiencing, relevance considerations prevents John from being assigned as the referent of *he* and thereby the sentence from connecting to the contexts.

Because pronouns have highly schematic specifications, they are not restrained by detailed demands on matching, and they will match almost any antecedent specification. Therefore, pronouns will usually find their match among the

most highly activated candidate antecedents, those in focus, as it is indeed the case in the corpus. Pragmatic considerations may prevent matching, as in the example above, but then the pronoun can not be matched, it has no referent in either of the two contexts.

In discourse that is not carefully planned, pronouns are often misunderstood, i.e. not matched in accordance with the intentions of the speaker; or they can not be matched at all, in spite of their referential promiscuity This is very evident in spoken dialogues where it is usual that a large amount of effort is directed at the prevention and repair of misunderstanding and lack of understanding.

The lack of a match occurs when the pronoun can not be matched with any of the most highly activated antecedents. The schematicity of the lexical specification imposes a restriction on pronouns that ensures that if they are not matched quickly, they are not matched at all, which is necessary because their referential promiscuity may otherwise give rise to misunderstandings. Since pronouns carry low activation potential, inversely related to their schematicity most of the triggering force must be provided by the antecedent, and only the most highly activated ones will carry sufficient activation for that. Antecedents that are too much out of focus (or generally· not recently mentioned) will usually not be sufficiently highly activated for the combined activations to reach the threshold, even if the specifications match.

The specifications of full nominals are less schematic than those of pronouns. Therefore, they have a higher activation potential and are capable of triggering antecedents with much lower activation levels than pronouns. At the same time, the relatively low schematicity of full nominals enables them to resist suggested matches that are less than perfect. Taken together, this means that the search for a match may proceed much longer than with pronouns, because of the low degree of schematicity of the specification, and may still succeed, because this also gives them high activation potential.

With bridging references, the antecedent specifications are highly schematic, and hence of a relatively low degree of activation, because they are introduced by means of the default specifications for objects and events, not by explicit mention. Therefore bridging references most usually require that the anaphoric expression is a full nominal with a high activation potential and they are uncommon with pronouns which have low potentials. And therefore, with bridging references, the antecedents are less distant than with identical references. The difference in the distribution of anaphoric nominals with bridging and identical reference over distances to the antecedents cannot be due to procedural information inherent in the type of anaphoric expression selected by the speaker because they are the same in the two cases, but must be explained in terms of properties on the side of the discourse representation.

Discourse Representation of Continuation c. ('The man got away')

event: escaping from [EVENT]
participants: **AGENT**· the man (male, singular)

Discourse Representation of Continuation d. ('The bastard got away')

event: escaping from [EVENT]
participants: agent: the bastard (male (?), sing., of low morals)

For continuations c. and d. in Context 1. the same argument as for b. is valid: the only candidate antecedent for *the man* or *the bastard* is John, and John is excluded for the same pragmatic reasons as with b.

In Context 2., continuations c. and d. are odd, but not quite unacceptable in the sense that, if uttered at all, they will be understood as connected, with the murderer as referent for *the man* or *the bastard*, which indicates that there is an uninstantiated specification of the murderer in the representation already, awaiting the assignment of reference, and the specifications of *the man* and *the bastard* are not sufficient to reject the proposed match. What makes these continuations odd in the context is relevance considerations: they are too abstract to be quite sufficiently informative, but on the other hand, connecting them to the context is the only way of maintaining referential continuity

Continuation d. is better than c. in Context 2. because *bastard* is (nearly) always used as a derogatory epithet, and is therefore not inappropriate for a criminal, while *man*, like other abstracts, has this use only in certain contexts - certainly in this one, if the connection is established. Even *the snake got away* which, on the face of it, should rule out a human antecedent by its lexical specification, would imply a human rather than a cobra in the context; with *kill* this would be different.

In sum: the murder event introduced by the verb in Context 2. has the three participants of agent, experiencer and instrument. Agent and experiencer are highly activated because the lexical specification construes them as central participants, while instrument is peripheral. In the discourse representation, experiencer is instantiated, because of the explicit mention, while the others are not, but because of the higher activation, an instantiation of agent is expected to a much higher degree than of instrument, and this forms the basis for connecting the two sentences by assigning the role of agent to the referent of *the man* or *the bastard*. In shorthand notation the superimposition and merging of the specification might come out like this:

2. *John was murdered yesterday*	[AG => INSTR => **EXP·John**] &
c. *The man got away*	not [man ≠ AG] & [man ≠ **EXP; John**]
2. + c.	[**AG: man** => INSTR => **EXP·John**]
2. *John was murdered yesterday*	[AG => INSTR => **EXP·John**] &
d. *The bastard got away*	not [bastard ≠ AG] & [bastard ≠ **EXP·John**]
2. + d.	[**AG: bastard** => INSTR => **EXP·John**]

A more extended version of the resulting representation is given below·

Discourse representation of 2 + c/d.

event: escaping from [event ('murder'):
subevents: result: dying
participants: **EXPERIENCER**: John (male. sing.)
cause: ('agent act upon experiencer with instrument)
subevents: result: ('instr inflict upon exp.')
cause: ('agent act upon instr ')
participants:
agent: the man/bastard (male, sing.)
EXPERIENCER: John (male, sing.)
instrument
participants: **agent**: the man/bastard,
EXPERIENCER: John (male, sing.),
instrument]
participants: **AGENT**· the man/bastard

Continuation e. connects in both contexts, but in 1 it is somewhat odd. The expression *the man who did it* specifies "a person who caused an event"

Discourse Representation of Continuation e. ('The man who did it got away')

event: escaping from [event: (causation)
subevents: cause, result
participants: **AGENT**· the man (male, sing.), ,.],
participants: **AGENT**· the man (male, sing.,)

In 1. there is indeed an event for *it* to be matched with, and since that event may have an agent if it is construed as the resulting event of a *kill* or *murder* event, *the man* may be matched also. But for reasons of informativeness, the speaker should have chosen a different expression than Context 1. if he was aware that John's death was caused by a person - or there should be intervening sentences to establish that.

1. *John died yesterday* [EXP· **John**] &
e. *The man who did it got away* [AG: **the man** => [EVENT]]
1. + e. [AG: **the man** => [EVENT· EXP· **John**]

Discourse Representation of 1 + e.

event: escaping from [event ('murder'):
subevents: **result: dying**
participants: experiencer: John
cause: ('agent act upon experiencer with instrument)
subevents: result: ('instr inflict upon exp.')
cause: ('agent act upon instr.')
participants: **AGENT**· the man who did it
EXPERIENCER: John
instrument
participants: **AGENT**· the man who did it
EXPERIENCER: John
instrument]
participants: **AGENT**· the man who did [EVENT· CAUSE, RESULT]

In 2. there is also an event for *it* to match, but there the event is specified as a murder event with an agent and *the man* is matched with AG without difficulty·

2. *John was murdered yesterday* [AG => INSTR => **EXP· John**] &
e. *The man who did it got away* [**AG: the man** => [EVENT]]
2. + e. [**AG: the man** .=> INSTR => **EXP· John**]

Discourse Representation of 2 + e.

event: escaping from [event ('murder'):
subevents: result: dying
participants: **EXPERIENCER**: John
cause: ('agent act upon experiencer with instrument)
subevents: result: ('instr. inflict upon exp.')
cause: ('agent act upon instr ')
participants: **AGENT**· the man who did it
EXPERIENCER: John
instrument
participants: **AGENT**· the man who did it
EXPERIENCER: John
instrument]
participants: **AGENT**· the man who did [EVENT· CAUSE, RESULT]

It is part of the lexical specification of *murderer* that it refers to "a person who illegally caused the death of some other person", that is, it is a relational concept that invokes a specification of the whole murder event with high activation of the agent role:

Lexical Representation of 'murderer'

label: MURDERER
sex: undefined (person)
event: ('murder')
subevents: result: dying
participants: **experiencer**
cause: ('agent act upon experiencer with instrument')
subevents: result: ('instr. inflict upon exp ')
cause: ('agent act upon instr ')
participants: **AGENT**· 'murderer',
experiencer,
instrument
participants: **AGENT**· 'murderer', **experiencer,** instrument]

This means that part of the representation of f. is a representation of a murder event, including the resulting dying event:

Discourse Representation of Continuation f. ('The murderer got away')

event: escaping from [event: ('murder')
subevents: result: dying
participants: **experiencer**
cause: ('agent act upon experiencer with instrument')
subevents: result: ('instr inflict upon exp.')
cause: ('agent act upon instr ')
participants: **AGENT**· murderer,
experiencer,
instrument
participants: **AGENT**· murderer, **experiencer,** instrument]
participants: **AGENT**· murderer

In Context 1. there is a dying event to match the resulting event of the specification of *murderer*, so *the murderer* will be connected via the dying event even though no agent is necessarily presupposed in it:

1. *John died yesterday* [**EXP**· **John**] &
f. *The murderer got away* [**AG: the murderer** => [INSTR => **EXP**]]
1. + f. [**AG: the murderer** => [INSTR => **EXP**· **John**]]

And in Context 2., the specifications of the two murder events overlap completely, only the activations and instantiations of the participants is different:

2. *John was murdered yesterday* [AG => INSTR => **EXP**· **John**] &
f. *The murderer got away* [**AG: the murderer** => INSTR => EXP]
2. + f. [**AG: the murderer** => INSTR => **EXP**· **John**]

If the connections are made, the resulting discourse representations will be very similar in the two contexts in terms of activated and instantiated participants. But actually, the connection will be stronger in Context 2., because of the complete overlap between the specifications involved. In Context 1., the causal relationship between the resulting and causing events must be inferred on a more sketchy basis than in 2. This means that the representation with 2. is more tightly knit, and the resulting activation of the complex as a whole should be higher

Discourse Representation of 1/2 + f.

event: escaping from [event: ('murder')
subevents: result: dying
participants: **EXPERIENCER**: John
cause: ('agent act upon experiencer with instrument')
subevents: result: ('instr inflict upon exp.')
cause: ('agent act upon instr ')
participants: **AGENT**· murderer,
EXPERIENCER: John,
instrument
participants: **AGENT**· the murderer,
EXPERIENCER: John,
instrument]
participants: **AGENT**· the murderer

In continuation g. the possessive construction anchors the referent of *murderer* to the referent of *his,,* which can only be John - the only male, singular antecedent, and plausible, too.

Continuation g. will definitely connect in both contexts, but the connection is stronger than with any other continuation: both contexts provide antecedent events that fit into the specification of *murderer* as before, but in g. there is also an explicit, however schematically specified, experiencer of that event with only one possible antecedent in the context. In Context 1. the information that John died in a murder event is added as a result of the merge between the specifications.

Discourse Representation of Continuation g. ('His murderer got away')

event: escaping from [event: ('murder')
subevents: result: dying
participants: **EXPERIENCER**: (male, sing.)
cause: ('agent act upon experiencer with instrument')
subevents: result: ('instr inflict upon exp.')
cause: ('agent act upon instr.')
participants: **AGENT**: his murderer,
EXPERIENCER: (male, sing.),
instrument
participants: **AGENT**: his murderer,
EXPERIENCER: (male, sing.),
instrument]
participants: **AGENT**: his murderer

Schematically, the superimposition and merging is like this:

1. *John died yesterday* [**EXP**: **John**] &
g. *His murderer got away* [**AG: his murderer** => [INSTR => **EXP**: (male, sing)]
1. + g. [**AG: his murderer** => [INSTR => **EXP**: **John**]]

2. *John was murdered yesterday* [**AG** => INSTR => **EXP**: **John**] &
g. *His murderer got away* [**AG: his murderer** => INSTR => **EXP**: male, sing.)]
2. + g. [**AG: his murderer** => INSTR => **EXP**: **John**]

And this is the resulting discourse representation:

Discourse Representation of 1/2 + g.

event: escaping from [event: ('murder')
subevents: result: dying
participants: **EXPERIENCER**: John
cause: ('agent act upon experiencer with instrument')
subevents: result: ('instr. inflict upon exp.')
cause: ('agent act upon instr ')
participants: **AGENT**: John's murderer,
EXPERIENCER: John,
instrument
participants: **AGENT**: John's murderer,
EXPERIENCER: John,
instrument]
participants: **AGENT**: John's murderer

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Summary in English

1. Introduction: Definite Nominals in Discourse Comprehension

Two major problems are considered in the present study of definite nominals and their relationship to antecedents:

1. what is the information content of the mental representation of discourse that hearers draw upon in the comprehension of definite nominals, and
2. how is that content structured.

The assumption underlying the study is that the presupposing relationships that obtain between definite nominals and their antecedents provide a window to the content and structure of the mental representation of discourse, which is tacit knowledge, not directly accessible by introspection.

The presentation of some theoretical approaches to discourse and anaphora in the introduction focuses on how these approaches view discourse comprehension and discourse representation generally, more specifically on how they view the resolution of anaphora, and most specifically on the treatment of bridging references in which the intended referent of an anaphor is not identical to the antecedent, even though it depends on it. The final section introduces the empirical study

1.1. An AI Approach to Discourse

Grosz & Sidner (1986) describe the structure of a discourse as a composite of three interacting components:

The *linguistic structure* represents the discourse in terms of segmentation and of coordination and subordination of segments. The *intentional structure* provides a complete history of the discourse purposes established so far and the relations between them, whereas the *attentional structure* is related only to currently unresolved purposes, but with a built-in structuring of its elements (discourse referents) that depends on the linguistic structures and expressions that provided its basis and determines the accessibility of the referents as antecedents. At the end of a discourse there will be a fully developed intentional structure, whereas the attentional structure will be empty

The main contribution of this and similar theories of discourse comprehension is the investigation of the focusing structures that determine the variation of the salience or accessibility of the discourse referents in their role as candidate antecedents for anaphors at the time when they are introduced in the representation of the discourse, and the investigation of possible computer implementations.

1.2. Mental Models as Discourse Representations

Mental models theory (Johnson-Laird 1983, Garnham 1987) sees discourse comprehension as the construction of one single mental model from the discourse, the context, and general background knowledge. The two principal factors that contribute to this are semantic *connectedness*, or referential coherence, between sentences, and pragmatic *plausibility* with respect to world knowledge. Sentences in a discourse are seen as instructions for building representations of the content of the discourse.

But two claims that are central to theory of mental models as discourse representations (at least in Garnham's version) appear to be problematic:

1. the psychologically important representations of discourse are mental models,
2. representations should center around tokens standing for things that the discourse is about, rather than for expressions in it.

However, in the general theory, propositional representations are as important psychologically as mental models because it is necessary to check the consistency of the model under construction against the propositions that furnished the blueprints. And even though referents should certainly be represented mentally, mere tokens with no internal structure are not sufficient, at least if they cannot be used to access the mental lexicon/encyclopedia. Also, the resolution of anaphora appears to access features that are usually attributed to expressions (grammatical gender is not a property of the referent). Finally, mental models can not account for the differentiation of accessibility of antecedents that appear to be of importance in the resolution of anaphora, because the history of the discourse must be represented outside the models.

1.3. Cognitive Linguistics

Similarly, cognitive linguistics, takes discourse to be represented as *mental spaces* (Fauconnier 1985) or *idealized cognitive models* (Lakoff 1987) that are constructed as the discourse proceeds. Linguistic expressions do not refer to objects in the real world: they provide guidelines for setting up, pointing to, etc., mental spaces and elements in mental spaces. These elements, then, may have reference. Mental spaces are continually modified to incorporate new spaces, elements and relations that are added in the discourse. Spaces may be included in each other and relationships may hold between elements belonging to different spaces.

One such space, the *current discourse space*, comprises the spaces, elements and relations that are taken to be shared by the speaker and hearer as the current basis for communication. These shared entities may figure directly in the awareness of the speaker and hearer, or they may be readily elicited by association or simple inference. (Langacker 1991).

1.4. Relevance Theory

Relevance Theory (Sperber & Wilson 1986) sees discourse comprehension as a form of inference which works because the processes involved are suitably constrained by relevance considerations which strike a balance between the contextual effects that can be obtained by processing a piece of information and the cognitive effort that is needed to process it. The processing effort is minimized because the contexts that must be accessed are ordered in such a way that sufficiently large contextual effects will be obtained early in the process of contextualizing new information.

The available contexts for this process are the *memory of the deductive device* which holds the results of the immediately preceding deduction together with the assumptions used in deriving them, *general-purpose short-term memory* which holds those results of previously performed deductions that were not used in the immediately preceding one; the *encyclopedic entries of concepts* that are present either in the context or in the assumption being processed, and finally the *observable physical environment* in which the discourse takes place.

So the representation of discourse is partitioned into an immediate context of currently or recently processed information and some more remote contexts with information that is not currently being processed, and from which general knowledge may be accessed as well as information derived from the setting of the speech event. The order in which they are accessed corresponds to the order of inclusion between them and the effort needed to access them: the current context is minimal and highly accessible, while the more remote ones are larger and more difficult to access.

Contextual effects are the result of the processing of utterances in still larger and less accessible contexts as long as the relevance is high enough, i.e. as long as the contextual effects yielded outweigh the effort of processing. Mira Ariel has proposed to view the resolution of anaphors in this perspective: antecedents are ordered by accessibility, and the forms used to express referents depend on the accessibility

1.5. The Empirical Study

The corpus studied consists of 22 short Danish texts and excerpts sampled from different sources: novels, formal and informal cook books, newspapers, and technical and non-technical instruction texts and manuals, including the discourse functions of narrative, instruction, argumentation, and description. The corpus contains a little more than 18000 words; the longest text has 2564 words, the shortest 307, and the average is 834. The corpus has more than 3500 definite nominals in it.

All **definite nominals** in the corpus were identified together with their **antecedents** (the referents presupposed by the definite nominals for the assignment of a referent). The definite nominals were coded for the type of **expression** used (the main focus in chapter 2), the semantic **relation** between anaphor and antecedent: whether the intended referent is *identical* to the

antecedent or some form of *bridging* inference is needed (the main focus in chapter 3), and for the **distance** (by number of intervening sentences) between the nominal and the last mention of the antecedent if that was introduced textually

2. Grammatical Cues

The first section introduces the types of nominal expressions that were studied, the second one presents the results in terms of the frequencies of different expressions with exophoric, identical, and bridging reference and their distributions over textual distances to the antecedents; the last one discusses some theories that have been proposed to account for the role of grammatical cues in the assignment of reference to definite nominals and finally proposes a reformulation of the GIVENNESS HIERARCHY proposed by Gundel et al. (1993).

2.1. Types of Nominals

Nominals were classified according to form into full definite nominals, definite pronouns, and proper names. Full nominals were further subdivided by type of determiner: *suffix, distal, proximal, possessive. Elliptical nominals* (without a head noun) were separated as a particular group; no attempt was made to distinguish those in which the descriptor functions as a head from those in which the head noun has been elided. Nominals with *postmodifiers* (prepositional phrases, relative clauses) were marked.

Definite and demonstrative pronouns comprise the following (including oblique and genitive forms where relevant):

personal	*jeg, du, han, hun , vi, I, De*
possessive	*min, din, sin* (reflexive also); *vor*
reflexive	*sig*
distal	*den, det, de*
proximal	*denne, dette, disse; den her, den der*
adverb	adverbials with *her-, der-* + preposition (such as *hertil, dertil*)

Proper names are names of persons, places, etc.

2.2. Empirical Results

Perhaps the most surprising finding (considering the literature) is the negative one: While categories of expressions do differ in mean referential distance, they are not (not even approximately) restricted to mutually exclusive intervals of referential distances. Some exhibit a maximum distance (it is possible that all categories would if the texts had been longer), but up to their maximum, all types can be used at any distance. Besides the possibility of a maximum, the main difference between the categories is in the distributions over distances: whether they prefer finding their antecedents in the same or the preceding sentence, and if the preceding sentence is preferred, whether same sentence or 2 sentences away is second.

Full definite nominals are used with long or short referential distances, and do not have a maximum. But a smaller proportion of them cover long distances than proper names. Like pronouns, they are quite often used with reference outside the text, but rather more with reference based on general knowledge.

More than half of the full nominals require bridging for reference assignment, and the profile of the referential distances covered in bridging is very different from the one for identical references. Nominals with bridging references exhibit a strong preference for short distances, and while it is uncertain whether they have a real maximum, it is noteworthy that less than 1% go beyond 10 sentences as opposed to 10% of the full nominals with identical reference.

Pronouns retrieve textual antecedents only at short referential distances (94% in the same or the preceding sentence) and have a maximum (in the corpus) of 7 sentences. They are often used with reference to the speech situation, especially 1st and 2nd person pronouns. Only few pronouns require bridging inferences for reference assignment, and most of those that do have referential postmodifiers.

Proper names can be used at any referential distance. Like the other categories, they show a preference for short distances, but they cover very long distances also and no maximum can be established. They are, however, most often used with referents that have not been mentioned before, and their definiteness never depends on previous mention only

Pronominal adverbs, proximal pronouns and proximal full nominals show a strong preference for retrieving their antecedents in the preceding sentence, and demonstrative full nominals, in contradistinction to most other types of full nominals have a maximum referential distance: for the distal demonstrative nominals (the subset without premodifiers) it is 6 sentences and for the proximals it is 3 sentences.

Elliptical nominals prefer same sentence and (with one exception) they have referential antecedents within 3 sentences.

2.3. Discussion

Expressions are not used to mark or signal the accessibility of antecedents on a more or less continuous scale (as proposed by Ariel 1988, 1990). The overlap between the referential distances covered by different types of expressions is far too great for that. Rather, the differences in the mean referential distance over which expressions retrieve antecedents result from differences in their lexical specifications: the more specific they are, the more candidate antecedents they can reject, and therefore they can keep the search continuing over longer distances. In the unmarked case, if a discourse referent that matches the lexical specification of an expression is encountered in the search, then that referent is the antecedent; the search is not prolonged because the cognitive cost allegedly associated with expression has not yet been paid, or abandoned before an antecedent is found because it has. But marked expressions (stress, demonstrativeness) are used with non-default retrieval.

Besides his persistence in using mean referential distance in spite of a theoretical refutation of it as distortive, the main problem in Givon (1992) is the claim that it is necessary (and possible) to establish the source of definiteness either in the situation, in generic knowledge or in the text on the basis of grammatical clues, independently of the search for a referent. But even though the devices suggested may have their prototypical base in one of the contexts, they are also used with the others to some degree, and no type of expression is excluded from any of the contexts. So it appears that if the source context is determined at all, this happens only as a result of finding the referent.

But expressions do have a procedural role. Definite nominals mark referents as uniquely identifiable to the hearer while indefinite nominals mark them as not uniquely identifiable. Type identifiability does not need specific grammatical marking, because it depends on the lexical specifications that are always present with full nominals. Demonstratives and other marked expressions indicate non-default retrieval, either in terms of the identification of the referent, or the information added to its specification.

Therefore I propose to view the Givenness Hierarchy proposed by Gundel et al 1992 as having the three unmarked levels of *in focus*, *uniquely identifiable*, and *type identifiable*, expressed by unstressed and non-demonstrative pronouns and determiners each with a marked companion corresponding to *activated*, *familiar*, and *referential*, and expressed by a stressed pronoun or determiner or by a lexicalized demonstrative.

Definite expressions, whether pronouns or full nominals, then conventionally indicate *unique identifiability* and indefinite expressions indicate *type identifiability*, but exclude unique identifiability The unmarked members of the paradigm extend also to the uses of the marked members in the non-contrastive cases.

The referents of unmarked pronouns are usually *in focus* The high degree of schematicity makes them promiscuous: they will match almost any specification offered as antecedent, and will therefore find antecedents among the candidates that are suggested very early in the search.

3. The Role of Lexical Specifications

The first section summarises some taxonomies that have been proposed for the types of anaphoric relationships, and introduces those found in the corpus in some detail. The second section presents further results of the study in terms of the frequencies of the different relationships with different expression types and the distributions of nominals with different relations to the antecedents over referential distances. The final section discusses the results with respect to theories that have been proposed to account for the role of lexical specifications in reference assignment.

3.1 Types of Anaphoric Relationships

The semantic relationships that were identified in the corpus as a basis for definite reference can be summarized as follows:

Some definite nominals have no textually introduced antecedent: they may be *exophoric* (with reference in the speech situation), or *generic* (with reference to a class rather than any individual member); or the expression may be *idiomatic*

Other definite nominals have *direct* reference: their antecedents were introduced explicitly The intended reference may be *identical* to the original one, which can obtained by *repetition* of the head, by *synonymy* or *abstraction* (including *pronouns*), or by using a *trope* (epithet, metaphor, or metonymy). Or the new reference may comprise only an *element* or *subset* of the original set; this is obtained by *quantification* or *specification* into a previously introduced set of referents.

And still others have *indirect reference*: their antecedents were not introduced by explicit mention but are related to explicit referents by lexical specification. Definite nominals may refer to uniquely identifiable *parts, properties, materials* (or ingredients), and *functions* of established discourse referents, relying on *object-based reference.* Or they may refer to uniquely identifiable participants and subevents in a variety of *event-based references*, not always easily definable. This includes reference based on *causativity, kinship,* and other relationally defined concepts. The relations are not always lexically defined on the word level, but may come out of a variety of syntactic constructions.

3.2. Empirical Results

Pronouns and proper names contribute almost only to direct reference. The same types of full nominal expressions are used with identical as well as bridging references: the expressions as such do not tell the hearer whether an identical or bridging reference was intended. Definiteness in itself only indicates that the referent is taken to be uniquely identifiable, but says nothing about the means needed for the identification, much less the relationship between the intended referent and the presupposed antecedent.

With respect to referential distance, the most interesting findings are that identical reference is different from the other bases for reference by having no maximum referential distance in the corpus, and that the maxima for object- and event-based reference are very different. For object-based reference it is 19 sentences, and for event-based reference it is 5 sentences. Identical reference, in contradistinction to the other relations, does not prefer antecedents from the same sentence, because intrasentential identical reference is most often achieved by a pronoun.

The antecedent relations that prefer short referential distances are often accomplished by the use of complex nominals with very concrete semantic specifications: only when the antecedent relation is kept constant do more comprehensive specifications retrieve over longer distances. What speakers do, is use semantic specifications to create contexts in which the referents they intend are sufficiently highly accessible for the hearers to identify them uniquely, rather than use long constructions to mark them as being difficult to retrieve.

3.3 Discussion

Some grammatical constructions are more helpful in this respect than others, and some of those are used extensively, or even exclusively, in bridging: possessive constructions allow the intended referent to be explicitly tied together with its antecedent, and referential modifiers may also give the relation explicitly But they are not mandatory· other constructions, notably plain definite nominals, are also used extensively in bridging.

So, if there is an obvious antecedent in the neighbourhood, possessives or other complex constructions are not necessary; if there is not, they are very useful for introducing one. The speaker uses linguistic expressions to convey the information that, in his view, is sufficient for the hearer to retrieve the intended referent. The possessive determiner provides a highly accessible antecedent, and the head conveys a type specification for the intended referent. Rather than signal cognitive cost, a nominal with a possessive determiner minimizes it.

4. Outline of a Process Model

Chapter 4 outlines a process model for discourse comprehension. Three aspects of the process are discussed:

1. the lexical-encyclopedic representation of the concepts for objects and events that are activated when an expression that matches the label of the lexical entry is encountered or when a matching specification has been constructed in the representation of the discourse or of a sentence being processed,
2. the construction of specifications for objects and events expressed by definite nominals or more comprehensive linguistic constructions; and
3. the building of a representation of the discourse as a network of object and event representations.

4.1. Representations: Lexicon to Discourse Model

Lexical entries

Lexical entries are labeled so that their conceptual content can be evoked by an expression (and vice versa for the expression of the content). Nouns and pronouns have information about *grammatical gender* which is relevant for retrieval by pronouns.

In concepts for **persons** and other animate objects (animals, teddy bears, etc.), *sex* (real or imagined) is or may be important for the choice of pronoun. In concepts for **objects** (including persons), the specification has components that specify the *parts* of the type of object in question and the *material* it consists of, as well as its *properties* and the *functions* that the object can be put to. In concepts for **events**, the specification has components that specify the *subevents* (sometimes expressed by a nominal) that comprise the event, and the (object) *participants* in the event in terms of their relation to it. **Relational** words (*murderer*, kinship terms) specify the intended referent in terms of its role as a participant in an event, related to the

event itself, or to other participants in it. The component parts of object and event specifications are not necessarily instantiated in the representation, but should be present as constraints on such instantiations.

Pronouns specify the intended referents only schematically· definite and demonstrative pronouns specify for gender and number, and personal pronouns for sex and number (for animate or "personal" referents). Therefore their referents must be sufficiently salient in the speech situation or sufficiently recently mentioned (and thereby salient) in the discourse to allow unique identification. **Determiners** specify in the same abstract manner, but the rest of the nominal will provide a fuller specification.

Nominals

Nominals are constructed from such lexical entries. Prototypically, they designate instantiations of things, whose specification is provided by the head along with the modifiers (adjectives etc.) that make the specification more precise. Such type specifications narrow down the set of instances that can be referenced by the nominal. But only in special cases do they single out only one possible referent without recourse to the discourse. At this stage, specifications of quantity and cognitive status (definiteness) are added.

Because of the missing head, a full specification can not be built directly from an elliptical nominal. Like a pronoun, the determiner provides a schematic specification of gender/number and cognitive status, but the main bulk of the specification must be retrieved from the discourse representation. If the ellipsis is definite, the specification is usually retrieved from the antecedent that anchors its reference, but, as in the only elliptical long distance retriever in the corpus, "reference antecedents" may be different from "specification antecedents"

The specification for nominals that consist only of a pronoun is simply a copy of the pronoun's lexical specification. Postmodifiers may be added in order to achieve unique identifiability

Discourse referents

The representation of discourse referents is derived from the specifications for nominals. From them they retain type and *quantification specifications*, but information about cognitive status, which is used as an instruction for the processing is omitted, and an activation level is added as the referent is incorporated in the discourse representation. Initially, the level of activation depends upon the saliency or topicality of the referent. Activation decreases over time, and "space builders" may increase or decrease the activation of connected complexes of referents (mental spaces) as wholes.

When an indefinite nominal is encountered, a new referent is introduced into the discourse representation by inserting its type and quantification specification as a representation of the referent at the currently active node.

When a definite nominal is encountered, the representation is searched for an antecedent, more highly activated discourse referents being tried first. The nominal's specification of type and quantification is merged with the antecedent's specification, so that information already present in the representation is retained and new information is added to it at the proper location. The referent is then activated if it was not previously instantiated, or reactivated if the instance was already there.

4.2. Retrieving Antecedents and Establishing Discourse Referents

The reactivation of a referent or instantiation of a new one specified by a definite nominal depends on two factors: there must be a match between the specification of an antecedent in the representation of the previous discourse and the specification constructed from the nominal, and the activation that results from the match must exceed a triggering level.

If there is sufficient overlap between the specifications, according to the criteria listed below, and the resulting activation is above the triggering level, the match succeeds. Pragmatic criteria may reject the match if the result is incomprehensible (not plausible).

Pronouns and other nominals with a highly schematic specification contribute little more than the match itself to the activation because the overlap is small. Therefore they can not trigger a match with an antecedent with low activation. But since they will match almost anything, their antecedents will be found quickly, among the highly activated candidates. Less schematic nominals contribute more because the overlap is greater, and they can reactivate antecedents relatively independently of their previous activation.

Criteria for matching

Direct Reference

With direct reference, the antecedent is an instantiated referent with a full specification. If the reference is intended to be identical, all sorts of definite nominals except possessive constructions are used. When set-element reference is intended only suffixed, distal and elliptical nominals occur in the corpus.

Matching criteria for identical reference:

1.1 all items in the type and quantification specification of the nominal have counterparts in the specification of an instantiated antecedent, or
1.2 if there are extra items they are either
  a. insignificant for reference (peripheral or attributive), or
  b. motivated.

The first criterion yields identical reference by repetition of the head noun and by the use of exact synonyms (if they exist), abstract words and pronouns, and it excludes the use of a more concrete word when the intended referent is identical to the antecedent.

The second criterion will yield identical reference even in cases were the specification of the nominal is not entirely included in the specification of the antecedent. With synonyms or near synonyms, extra items in the specification are seen as peripheral. If modifiers are added, they are understood as attributive. And if epithets and metaphors are used, extra items will be seen as motivated, usually by the speaker's attitude, rather than the referent itself.

Matching criteria for set-element reference:

2. some items in the type or quantification specification from the nominal are added and/or contrastive with respect to the specification of an instantiated antecedent, and

   the antecedent can be construed as plural, and

   a. the quantification specified in the nominal quantifies within the antecedent set, and/or
   b. the added or contrastive item in the type specification of the nominal specifies a subset with a particular property within the antecedent set.

These criteria yield a referent which is a subset or element of the antecedent set. The extra quantification or specification may be expressed by an added modifier or it may be inherent in the lexical specification of the noun, i.e., either a relational word or a more concrete word is used.

Object and Event Based Reference

With object and event based reference, the antecedent is not an instance, but an uninstantiated component of the specification of an instantiated discourse referent. Because such antecedents are uninstantiated, they have fairly low activation, depending to some degree on the centrality of the component in the complex. Therefore it usually takes a full nominal to effect an instantiation by a bridging inference.

Matching criteria for object and event based reference

3. the specification of the antecedent which constrains possible instantiations is a non-instantiated component of the specification of an instantiated discourse referent, and

   the specification of the nominal satisfies those constraints

With object-based reference the antecedent specifies either a part, property or function of the object in question, or the material or ingredients of which it consists, and the intended referent is an instance that conforms to that specification. With event-based reference the antecedent specifies either a subevent or a participant in the event, and the intended referent is an instance that satisfies the constraints given.

Resumé på dansk

1. Indledning: bestemte nominaler i diskursforståelse

De to væsentligste problemer som behandles i denne undersøgelse af bestemte nominaler og de relationer de har til deres antecedenter er

1. hvilken information indeholder den mentale repræsentation af diskurs som modtagere benytter sig af i forståelsen af bestemte nominaler, og
2. hvordan er dette indhold struktureret.

Det er en grundlæggende antagelse i undersøgelsen at de forudsætningsforhold der findes mellem bestemte nominaler og deres antecedenter giver en indirekte adgang til strukturen og indholdet i den mentale repræsentation af diskursen, som er "tavs viden", ikke direkte tilgængelig ved hjælp af introspektion.

Præsentationen af nogle teoretiske opfattelser af diskurs og anafori i indledningen fokuserer generelt på deres opfattelse af diskursforståelse og -repræsentation, mere specifikt på deres opfattelse af anaforopløsning og især på behandlingen af "bridging" hvor den intenderede referent for et anaforisk udtryk ikke er identisk med antecedenten selvom referencen afhænger af den og hvor der derfor skal "bygges bro" imellem referencerne. Det sidste afsnit introducerer den empiriske undersøgelse.

1.1. En AI opfattelse af diskurs

Grosz & Sidner (1986) beskriver strukturen i en diskurs som sammensat af tre samvirkende komponenter:

Den *sproglige* struktur repræsenterer diskursens segmenter og deres indbyrdes side- og underordningsforhold. Den *intentionelle* struktur giver en komplet historisk oversigt over de hidtil etablerede diskursformål og forholdene mellem dem, mens *opmærksomheds*strukturen kun forholder sig til de formål som i det givne øjeblik ikke er opfyldt. Den har en indbygget strukturering af diskursens elementer (diskursreferenterne) som afhænger af den sproglige struktur og de udtryk den bygger på, og den bestemmer diskursreferenternes tilgængelighed som antecedenter Når en diskurs slutter vil der være en fuldt udbygget intentionel struktur, hvorimod opmærksomhedsstrukturen vil være tom.

Det væsentligste bidrag fra denne og lignende teorier om diskursforståelse er undersøgelsen af de fokuseringsstrukturer som afgør hvor fremtrædende eller tilgængelige referenter er i deres rolle som mulige antecedenter for anaforer pa det tidspunkt hvor de indføres i diskursen. Desuden har man undersøgt forskellige muligheder for computer-implementering.

1.2. Mentale modeller som repræsentation af diskurs

Teorien om mentale modeller (Johnson-Laird 1983, Garnham 1987) ser diskursfostående som opbygning af en enkelt mental model ud fra diskursen selv, dens

kontext og generel baggrundsviden. De to vigtigste faktorer der bidrager til dette er den semantiske *sammenhæng*, eller referentielle kohærens, mellem sætninger og den pragmatiske *plausibilitet* i forhold til viden om verdens beskaffenhed. Sætningerne i en diskurs ses som instruktioner for opbygningen af repræsentationer af diskursens indhold.

Men der er to centrale påstande denne teori (i hvert i Garnhams version af den) som er tvivlsomme:

1. de psykologisk vigtige repræsentationer af diskurs er mentale modeller, og
2. repræsentationer består af tegn ("tokens") som står for ting som diskursen handler om, ikke for udtryk i den.

Men i den generelle teori er propositionelle repræsentationer lige vigtige som mentale modeller fordi det er nødvendigt at kontrollere at den model som opbygges er konsistent med de propositioner som gav blatrykkene. Og selv om referenter bestemt skal repræsenteres, så er "tokens" uden intern struktur ikke tilstrækkelige, eller i hvert fald kun hvis de også kan anvendes til opslag i den mentale ordbog/encyclopædi. Endvidere ser det ud som om anaforopløsningen har adgang til træk som normalt henføres til udtryk (grammatisk køn er ikke en egenskab ved referenter). Endelig kan mentale modeller ikke gøre rede for den differentiering i antecedenters tilgængelighed som er væsentlig for anafor-opløsningen, fordi diskursens historie kun kan repræsenteres uden for modellerne.

1.3. Kognitiv lingvistik

På lignende måde opfatter den kognitive lingvistik diskursrepræsentationen som bestående af *mentale rum* (Fauconnier 1985) eller *idealiserede kognitive modeller* (Lakoff 1987) som konstrueres efterhånden som diskursen skrider frem. Sproglige udtryk henviser ikke til genstande i den virkelige verden, men giver retningslinjer for opbygningen, udpegningen osv af mentale rum og elementer i mentale rum. Disse elementer kan så have reference. De mentale rum ændres løbende for at kunne optage nye rum, elementer og relationer som tilføjes i diskursen. Rum kan være indeholdt i hinanden, og der kan være relationer mellem elementer der hører til forskellige rum.

Et af disse rum, det *aktuelle diskursrum*, omfatter de rum, elementer og relationer der regnes som fælles for afsender og modtager som det aktuelle grundlag for kommunikationen. Disse fælles entiteter kan optræde direkte i afsenderens og modtagerens opmærksomhed eller de kan let fremkaldes ved association eller simple inferenser.

1.4. Relevansteori

Relevansteorien (Sperber & Wilson 1986) ser diskursforståelse som en form for inferens som virker fordi de involverede processer er begrænset så de passer til formålet. Relevanshensyn afstedkommer en balance mellem de kontekstuelle effekter der kan opnas ved at forarbejde en given information og den kognitive indsats forarbejdningen kræver. Forarbejdningsindsatsen minimeres ved at de

kontekster den skal have adgang til er ordnet på en sådan måde at tilstrækkelig store kontekstuelle effekter opnås tidligt i forabejdningen.

De kontekster der bruges i denne forarbejdning er *hukommelsen i den deduktive mekanisme* som indeholder resultaterne af den umiddelbart foregående deduktion sammen med de antagelser der indgik i afledningen af dem, den *generelle korttids-hukommelse* som indeholder resultaterne af tidligere deduktioner som ikke blev anvendt i den umiddelbart foregående; de *encyclopædiske leksikonindgange* for begreber som er tilstede enten i konteksten eller i den antagelse der forarbejdes; og endelig de *observerbare fysiske omgivelser* hvor diskursen finder sted.

Repræsentationen af diskursen er altså opdelt i en umiddelbar kontekst bestående af information der er under forarbejdning eller lige har været det og nogle fjernere kontekster med information som ikke forarbejdes i øjeblikket og hvorfra der er adgang til generel viden og til information der stammer fra omgivelserne. Den rækkefølge hvori disse kontekster anvendes i forarbejdningen svarer til den rækkefølge hvori de indeholdt i hinanden og til den indsats der skal til for at åbne dem: den aktuelle kontekst er minimal og meget tilgængelig, de fjernere er mere omfattende og vanskeligt tilgængelige.

Kontekstuelle effekter opnås ved at forarbejde ytringer i stadig mere omfattende og mindre tilgængelige kontekster så længe relevansen er tilstrækkelig stor, dvs så længe de kontekstuelle effekter opvejer forarbejdningsindsatsen. Mira Ariel har foreslået at opløsningen af anaforer skal ses i dette perspektiv: antecedenter er ordnet efter tilgængelighed og de former som anvendes til at udtrykke referenter afhænger af deres tilgængelighed.

1.5. Den empiriske undersøgelse

Det undersøgte korpus består af 22 korte danske tekster og uddrag samlet fra forskellige kilder: romaner, formelle og uformelle kogebøger, aviser og tekniske og ikke tekniske instruktionsbøger og manualer. De omfatter diskursfunktionerne fortælling, instruktion, argumentation og beskrivelse. Korpus indeholder lidt over 18000 ord, den længste tekst er på 2564 ord, den korteste på 307 ord og gennemsnittet er 834. Korpus indeholder mere end 3500 bestemte nominaler

Alle **bestemte nominaler** i korpus blev identificeret tillige med deres **antecedenter** (de referenter som forudsættes for at det bestemte nominal kan tilskrives reference). De bestemte nominaler blev kodet for type af **udtryk** (fokus i kapitel 2), den semantiske **relation** mellem anafor og antecedent: om den intenderede referent er *identisk* med antecedenten, eller en eller anden form for *brobygning* ("bridging") er nødvendig (fokus i kapitel 3) og for **afstanden** (i antal mellemliggende sætninger) mellem nominalet og den seneste omtale af antecedenten hvis den er blevet introduceret eksplicit.

2. Grammatiske træk som "stikord"

Det første afsnit præsenterer de typer af nominale udtryk som blev undersøgt; det andet gennemgår resultaterne i form af hyppigheder af forskellige typer af udtryk med exoforiske, identiske og "brobyggende" referencer, og fordelingen af dem

over forskellige afstande til antecedenterne; det sidste diskuterer nogle teoretiske redegørelser for den rolle som grammatiske træk spiller for tilskrivningen af reference til bestemte nominaler og foreslår en omformulering af det "bekendthedshierarki" (givenness hierarchy) som Gundel et al. (1993) har foreslået.

2.1. Typer af nominaler

Nominalerne blev klassificeret efter deres form i bestemte helnominaler, bestemte pronominer og egennavne. Helnominalerne blev underinddelt efter bestemmerleddets type: *suffix, distal, proximal, possessiv. Elliptiske nominaler* (uden substantiv som kerneled) udgør en gruppe for sig; der er ikke gjort forsøg på at skelne mellem de egentlig elliptiske (med elideret kerneled) og dem hvor en beskriver fungerer som kerne. Nominaler med efterhængte modifikatorer (præpositionsled og relativsætninger) blev markeret.

Bestemte og demonstrative pronominer omfatter de følgende (inklusive oblike og genitive former hvor de forekommer):

personlige	*jeg, du, han, hun, vi, I, De*
possessive	*min, din, sin* (også refleksivt), *vor*
refleksive	*sig*
distale	*den, det, de*
proximale	*denne, dette, disse, den her, den der*
adverbier	adverbier med *her-, der-* + præposition (som *hertil, dertil*).

Egennavne er navne på personer, steder osv

2.2. Empiriske resultater

Det mest overraskende fund (i betragtning af litteraturen) er måske det negative: selvom forskellige kategorier af udtryk har forskellige gennemsnit for referentiel afstand, så er de ikke (ikke engang tilnærmelsesvis) bundet til gensidigt ekslusive intervaller af referentiel afstand. Nogle har en maximumsafstand (og det er muligt at alle ville have haft det hvis teksterne havde været længere), men op til dette maximum kan alle typer anvendes med en hvilken som helst afstand. Udover muligheden af et maximum findes den vigtigste forskel mellem kategorierne i fordelingen over afstande: om de fortrinsvis finder deres antecedenter i den samme eller den foregående sætning, og hvis den foregående sætning er den foretrukne, om samme sætning eller 2 sætninger væk er nummer to.

Bestemte helnominaler anvendes med både lange og korte referentielle afstande og har ikke noget maximum. Men en mindre andel af dem dækker lange afstande end ved egennavne. Ligesom pronominer bruges de ofte med reference uden for teksten, men mest med reference baseret på generel viden.

Ved mere end halvdelen af helnominalerne må der bygges bro for at tilskrive reference, og profilen for de referentielle afstande der dækkes i sådanne tilfælde er meget forskellig fra den man finder med identisk reference. Nominaler der kræver

brobygning har en stærk præference for korte afstande, og selv om det er usikkert om de har et egentligt maximum sa er det værd at bemærke at mindre end 1% går ud over 10 sætninger i modsætning til 10% af dem der har identisk reference.

Pronominer finder kun deres antecedenter på korte distancer (94% i samme eller foregående sætning) og har et maximum (i korpus) på 7 sætninger De bruges ofte med reference til talesituationen, især 1. og 2. persons pronominer. Kun ganske få pronominer kræver brobygning og de fleste af dem har referentielle modifikatorer

Egennavne kan bruges på alle afstande. Ligesom de andre kategorier har de en præsference for korte afstande, men de dækker også meget lange afstande og har ikke noget maximum. Men de bruges mest om referenter der ikke har været nævnt tidligere, og deres bestemthed afhænger aldrig af tidligere omtale alene.

Pronominelle adverbier, proximale pronominer og proximale helnominaler foretrækker klart antecedenter i den foregående sætning, og til forskel fra de fleste andre typer af helnominaler har de demonstrative et maximum: for de distale (den gruppe der ikke har et foranstillet beskriverled) er det på 6 sætninger, og for de proximale er det 3 sætninger

Elliptiske nominaler foretrækker samme sætning og har (med en enkelt undtagelse) et maximum på 3 sætninger

2.3. Diskussion

Udtryk anvendes ikke til at markere eller signalere antecedenters tilgængelighed på en mere eller mindre kontinuert skala (som foreslået af Ariel 1988, 1990). Overlappet mellem de referentielle afstande der dækkes af forskellige typer af udtryk er alt for stort til det. Forskellene imellem de gennemsnitlige referentielle afstande som forskellige typer af udtryk henter deres antecedenter over er snarere et resultat af forskellene mellem udtrykkenes leksikalske specifikation: jo mere specifikke de er, jo flere foreslaede antecedenter kan de afvise, og derfor kan de holde søgningen i gang over længere afstande. I umarkerede tilfælde vil den første referent der antræffes under søgningen og som matcher den leksikalske specifikation for et udtryk, blive taget som antecedent. Søgningen bliver ikke forlænget fordi den kognitive omkostning som udtrykket hævdes at angive endnu ikke er blevet betalt; eller opgivet før der er fundet en antecedent fordi den er betalt. Men markerede udtryk (tryk, demonstrativer) kan anvendes når genfindingsproceduren afviger fra det normale.

Det vigtigste problem i Givon (1992) - bortset fra at han bliver at anvende den gennemsnitlige referentielle distance på trods af at han teoretisk afviser den som forvrængende - er påstanden om at det er nødvendigt (og muligt) ved hjælp af grammatiske træk at afgøre om kilden til et udtryks bestemthed er talesituationen, almen viden eller teksten, uafhængigt af søgningen efter en referent. Men selv om de mekanismer der foreslås har deres prototypiske udgangspunkt i en af disse kontekster, så bruges de ogsa i et vist omfang i de andre, og der synes ikke at være nogen typer af udtryk der er udelukket i nogen af konteksterne. Så hvis kildekonteksten overhovedet bestemmes, så må det ske som resultat af at der findes en referent.

Men udtryk spiller alligevel en procedural rolle. Bestemte nominaler markerer referenter som unikt identificerbare for modtageren, mens ubestemte nominaler markerer dem som ikke unikt identificerbare. Type-identificerbarhed forudsætter ikke specifik grammatisk markering, fordi den afhænger af de leksikalske specifikationer der altid er til stede i helnominaler. Demonstrativer og andre markerede udtryk indicerer at genfindingen ikke foregår efter den normale procedure, enten i forhold til identifikationen af referenten eller den information der tilføjes til dens specifikation.

Derfor foreslår jeg at Gundel et al.s (1993) "bekendtheds-hierarki" (givenness hierarchy) ommøbleres så det har tre umarkerede niveauer: *fokuseret, unikt identificerbar* og *type-identificerbar* der udtrykkes med trykløse og ikke-demonstrative pronominer og bestemmere, og at hvert af disse niveauer har en markeret makker, svarende til *aktiveret, bekendt* og *referentiel,* der udtrykkes ved hjælp af trykstærke pronominer og bestemmere eller leksikaliserede demonstrativer

Bestemte udtryk, pronominer eller helnominaler, vil sa konventionelt udtrykke *unikt identificerbare* referenter, mens ubestemte bruges til at udtrykke *type-identificerbare* referenter I ikke-kontrastive tilfælde dækker de umarkerede led i paradigmet også de markeredes anvendelser

Referenterne for umarkerede pronominer er normalt i *fokus.* Den høje grad af skematicitet gør dem promiskuøse: de matcher stort set enhver specifikation der tilbydes som antecedent og finder derfor antecedenter blandt de kandidater der tilbydes tidligt i søgningen.

3. Leksikalske specifikationers rolle

Det første afsnit sammenfatter nogle taksonomier for typer af anaforiske relationer som er blevet foreslået i litteraturen, og introducerer de typer der blev fundet i korpus nærmere. Det andet afsnit præsenterer yderligere resultater af undersøgelsen i form af hyppigheder af de forskellige typer af relationer i forhold til forskellige typer af udtryk og fordelingen af nominaler med forskellige relationer over referentielle afstande. Det sidste afsnit diskuterer resultaterne i forhold til teorier som er blevet foreslået for at gøre rede for den rolle som leksikalske specifikationer spiller i tilskrivningen af reference.

3.1. Typer af anaforiske relationer

De semantiske relationer som fandtes i korpus som grundlag for bestemt reference kan opsummeres som følger·

Nogle bestemte nominaler har ikke nogen tekstuelt indført antecedent: de kan være *exoforiske* (med reference i talesituationen), eller *generiske* (med reference til en klasse, snarere end noget enkelt medlem af den); eller udtrykket kan være *idiomatisk*

Andre bestemte nominaler har *direkte reference*: deres antecedenter er blevet indført eksplicit. Den intenderede reference kan være *identisk* med den oprindelige, hvilket

opnås ved *gentagelse* af kernesubstantivet, ved *synonymi* eller *abstraktion* (inklusive *pronominer*), eller ved hjælp af *troper* (epiteter, metaforer eller metonymier). Eller den nye reference omfatter kun et enkelt *element* eller en *delmængde* af den oprindelige mængde. Det opnås ved *kvantifikation* eller *specification* inden for en tidligere indført mængde af referenter

Andre igen har indirekte reference: deres antecedenter er ikke blevet indført ved at blive nævnt eksplicit men er relateret til eksplicitte referenter gennem deres leksikalske specifikation. Bestemte nominaler kan referere til unikt identificerbare *dele, egenskaber, materialer* (eller ingredienser) og *funktioner* ved *objektbaseret reference* Eller de kan referere til unikt identificerbare deltagere og delhændelser i forskelligartede *hændelsesbaserede references*, ikke altid lige til at definere. Herunder hører reference baseret på *kausativitet, slægtskab* og andre relationelt definerede begreber Disse relationer er ikke altid leksikalsk definerede på ordniveau, men kan være resultat af forskellige syntaktiske konstruktioner

3.2. Empiriske resultater

Pronominer og egennavne bidrager næsten kun til direkte reference. De samme typer af hele nominale udtryk bruges med identisk såvel som brobyggende referencer: udtrykkene som sådan fortæller ikke modtageren om den intenderede reference er identisk eller brobyggende. Bestemtheden selv viser kun at referenten regnes for unikt identificerbar, men siger ikke noget om hvilke midler der skal bruges til identifikationen, og slet ikke om relationen mellem den intenderede referent og den forudsatte antecedent.

Hvad angår den referentielle afstand, så er de mest interessante fund at identisk reference er forskellig fra de andre grundlag for reference ved ikke at have nogen maximal afstand i korpus, og at de maximale afstande for objektbaseret og hændelsesbaseret reference er meget forskellige. For objektbaseret reference er den 19 sætninger og for hændelsesbaseret 5 sætninger. Til forskel fra de andre relationer foretrækker identisk reference ikke antecedenter fra samme sætning fordi identisk reference inden for sætningen normalt etableres ved hjælp af et pronomen.

De antecedentrelationer som foretrækker meget korte referentielle afstande etableres ofte ved at der anvendes komplekse nominaler med meget konkrete semantiske specifikationer: kun når antecedentrelationen holdes konstant er antecedenterne til mere omfattende specifikationer længere borte. Det som afsendere gør er at bruge semantiske specifikationer til at skabe kontekster hvor de intenderede referenter er tilstrækkelig tilgængelige for modtagerne til at de kan identificere dem entydigt, snarere end at bruge lange konstruktioner til at markere at de er svære at finde.

3.3. Diskussion

Nogle grammatiske konstruktioner er mere nyttige end andre i denne henseende, og nogle af disse bruges i meget udstrakt grad (eller kun) til brobygning: ved hjælp af possessive konstruktioner kan de intenderede referenter bindes eksplicit

sammen med deres antecedenter, og referentielle modifikatorer kan endda udtrykke relationen eksplicit. Men de er ikke obligatoriske: andre konstruktioner, også helt almindelige nominaler, bruges også i udstrakt grad til brobygning.

Så hvis der er en indlysende antecedent i nærheden, er det ikke nødvendigt at bruge possessive eller andre komplekse udtryk; hvis der ikke er, er de gode til at indføre dem. Afsenderen bruger sproglige udtryk til at give den information som efter hans bedste mening er tilstrækkelig til at modtageren kan finde referenten. Det possessive bestemmerled giver en meget tilgængelig antecedent, og kerneleddet en specifikation af den intenderede referents type. Et nominal med possessivt bestemmerled signalerer ikke den kognitive omkostning ved søgningen, men minimerer den.

4. Udkast til en procesmodel

Kapitel 4 skitserer en procesmodel for diskursforståelse. Tre aspekter af denne proces diskuteres:

1. den leksikalsk-encyklopædiske repræsentation af begreberne for objekter og hændelser som aktiveres når modtageren støder på et udtryk der matcher opslagsordet, eller når en specifikation der matcher er blevet konstrueret i repræsentationen af diskursen eller af en sætning der er under forarbejdning;
2. konstruktionen af specifikationer for objekter og hændelser som udtrykkes af bestemte nominaler eller mere omfattende sproglige konstruktioner; og
3. opbygningen af en repræsentation af diskursen som et netværk af repræsentationer af objekter og hændelser

4.1. Repræsentationer: fra leksikon til model af diskurs

4.1.1. Leksikonindgange

Leksikonindgange har opslagsord sådan at deres begrebslige indhold kan fremkaldes af et udtryk (og vice versa for at udtrykke dette indhold). Substantiver og pronominer har information om *grammatisk køn*, hvilket er relevant når der skal findes antecedenter for pronominer

I begreber for **personer** og andre besjælede objekter (dyr, bamser osv) er *naturligt køn* (virkeligt eller imaginært) væsentligt for valget af pronomen. I begreber for objekter indeholder specikationen komponenter der specificerer de *dele* og det *stof* som et object af den angivne art består af, sammen med dets *egenskaber* og de *funktioner* det kan opfylde. I begreber for hændelser indeholder specifikationen komponenter der specificerer de *delhændelser* (somme tider udtrykt ved hjælp af et nominal) som hændelsen består af og for dens (objektmæssige) *deltagere* i forhold til hændelsen som helhed. *Relationelle* ord (*mor*, slægtskabstermer) specificerer den intenderede referent ved hjælp af dens rolle som deltager i en hændelse, relateret til hændelsen selv eller andre deltagere i den. Komponenter i specifikationerne for objekter og hændelser instantieres ikke nødvendigvis i

repræsentationen, men må være tilstede som begrænsninger på sådanne instantieringer

Pronominer specificerer kun de intenderede referenter skematisk: bestemte og demonstrative pronominer specificerer for grammatisk køn og tal, og personlige pronominer for naturligt køn og tal (for besjælede eller "personlige" referenter). Derfor må deres antecedenter være tilstrækkelig aktiverede i talesituationen eller være omtalt for nylig (og derfor aktiverede) i diskursen for at gøre unik identifikation mulig. **Bestemmere** specificerer på samme abstrakte måde, men resten af nominalet giver en mere fuldstændig specifikation.

4.1.2. Nominaler

Nominaler konstrueres ud fra sådanne leksikonindgange. Prototypisk betegner de instantieringer af ting hvis specifikation kommer fra kerneleddet sammen med de modifikatorer (adjektiver m.v) som gør specifikationen mere præcis. Typespecifikationen indsnævrer den mængde af genstande som nominalet kan referere til. Men kun i særlige tilfælde udpeger den en enkelt referent uden rekurs til diskursen. På dette tidspunkt tilføjes information om den intenderede referents kognitive status som en instruktion til søgningen efter eller oprettelsen af diskursreferenten.

På grund af det manglende kerneled kan en fuldstændig specifikation ikke opbygges på grundlag af et elliptisk nominal. På samme måde som et pronomen giver bestemmeren en skematisk specifikation af køn/tal og kognitiv status, men hovedparten af specifikationen må hentes fra repræsentationen af diskursen. Hvis ellipsen er bestemt hentes specifikationen som regel fra den antecedent der også forankrer referencen, men "referentielle antecedenter" kan være forskellige fra "specifications-antecedenter" - som i den eneste ellipse i korpus der finder sin antecedent langt borte.

Specifikationen for nominaler der kun består af et pronomen er blot en kopi af pronominets leksikalske specifikation. Efterhængte modifikatorer kan tilføjes for at opnå unik identificerbarhed.

4.1.3. Diskursreferenter

Repræsentationen af diskursreferenter afledes af specifikationerne for nominaler Fra dem beholder de specifikationer af type og kvantitet, men informationen om kognitiv status som bruges som instruktion til forarbejdningen slettes og i stedet indføres der et aktiveringsniveau når referenten inkorporeres i repræsentationen. I første omgang afhænger aktiveringsgraden af referentens topikalitet. Aktiveringen bliver mindre over tid, og "rumskabere" kan op- eller nedskrive aktiveringen af forbundne referenter som helhed (mentale rum).

Hvis der er tale om et ubestemt nominal introduceres der en ny referent ved at dets specifikation af type og kvantitet indsættes som repræsentation af referenten under den aktive knude i netværket.

Hvis nominalet er bestemt må der søges i repræsentationen efter en referent, sådan at mere aktiverede referenter prøves først. Nominalets specifikation af type og kvantitet smeltes sammen med antecedentens specifikation sådan at information der allerede er til stede i repræsentationen beholdes og ny information indsættes på det rigtige sted. Derefter aktiveres referenten hvis den ikke tidligere var instantieret, eller den reaktiveres hvis instantieringen allerede var der

4.2. Søgning efter antecedenter og oprettelse af diskursreferenter

Reaktivering af en referent eller instantiering af en ny som er specificeret af et bestemt nominal afhænger af to faktorer· dels skal der være en match mellem antecedentens specifikation i repræsentationen af den forudgående diskurs og den specifikation der konstrueres ud fra nominalet, og dels skal den aktivering der resulterer af matchen overskride et tærskelniveau.

Hvis overlappet mellem specifikationerne er tilstrækkeligt efter de nedenstående kriterier og den resulterende aktivering overskrider tærskelen så lykkes matchen. Matchen kan dog afvises på grundlag af pragmatiske kriterier hvis resultatet er uforståeligt (ikke plausibelt).

Pronominer og andre nominaler med meget skematiske specifikationer bidrager næsten kun med selve matchningen til aktiveringen fordi overlappet er lille. Derfor kan de ikke afstedkomme en matchning med en lavt aktiveret antecedent. Men da de matcher næsten hvad som helst vil de hurtigt finde en antecedent mellem de mest aktiverede muligheder Mindre skematiske nominaler bidrager mere fordi overlappet er større og de kan reaktivere antecedenter relativt uafhængigt af deres tidligere aktivering.

Kriterier for matching

Direkte reference

Ved direkte reference er antecedenten en instantieret referent med en fuldstændig specifikation. Hvis referencen er intenderet som identisk anvendes alle former for bestemte nominaler undtagen possessiv-konstruktioner. Hvis hensigten er en mængde-element reference optræder der i korpus kun nominaler med kerneled i bestemt form eller med distal bestemmer, herunder ellipser.

Matchningskriterier for identisk reference

1.1 alle elementer i nominalets specifikation af type og kvantitet har modparter i specifikationen af den instantierede antecedent, eller

1.2 hvis der er overskydende elementer så er de enten
   a. uden betydning for referencen (perifere eller attributive), eller
   b. motiverede.

Det første kriterium giver identisk reference ved gentagelse af kernesubstantivet og ved nøjagtige synonymer (hvis sådanne findes), ved abstrakter og pronominer, og det udelukker anvendelsen af et mere konkret ord når den intenderede referent er identisk med antecedenten.

Det andet kriterium giver identisk reference også i tilfælde hvor specifikationen af nominalet ikke er fuldstændig indeholdt i antecedentens specifikation. Ved synonymer og næsten-synonymer, ses de overskydende elementer som perifere. Hvis der er tilføjet modifikatorer forstås de som attributive. Og hvis epiteter og metaforer anvendes ses de ekstra elementer som motiverede, som regel af afsenderens holdning, snarere end referenten selv

Matchningskriterier for mængde-element reference

2. nogle elementer i nominalets specifikation af type eller kvantitet er tilføjede og/eller kontrastive i forhold til specifikationen af en instantieret antecedent, og

   antecedenten kan ses som en flerhed, og

   a. den kvantitet som er specificeret for nominalet kvantificerer inden for antecedent-mængden og/eller
   b. det tilføjede eller kontrastive element i nominalets typespecifikation specificerer en delmængde med en bestemt egenskab inden for antecedent-mængden.

Disse kriterier giver en referent som er en delmængde eller et element i antecedent-mængden. Den ekstra kvantifikation eller specifikation kan udtrykkes ved hjælp af en tilføjet modifikator eller den kan være inhærent i substantivets leksikalske specifikation, dvs. enten bruges der et relationelt ord eller et mere konkret ord.

Objekt- og hændelsesbaseret reference

Ved objekt- og hændelsesbaseret reference er antecedenten ikke instantieret, men er en ikke-instantieret komponent i specifikationen af en instantieret diskursreferent. Da sådanne antecedenter ikke er instantierede er de relativt lavt aktiverede, i nogen grad afhængigt af hvor central komponenten er i komplekset. derfor skal der normalt et helnominal til at effektuere en instantiering ved brobygning.

Matchning-kriterier for objekt- og hændelsesbaseret reference

3. den specifikation af antecedenten som lægger begrænsninger på de mulige antecedenter er en ikke instantieret komponent i specifikationen af en instantieret diskursreferent, og

   nominalets specifikation opfylder disse begrænsninger

Ved objekt-baseret reference specificerer antecedenten enten en del, egenskab eller funktion ved det pågældende objekt eller det stof eller de ingredienser det består af. Ved hændelsesbaseret reference specificerer antecedenten enten en delhændelse eller en deltager i hændelsen og den intenderede referent er en instantiering der opfylder de givne begrænsninger